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THE

AMERICAN JOURNAL

—OF—

BOSTON MEDICAL LIBRARY ASS'N.

DENTAL SCIENCE,

—EDITED BY—

F. J. S. GORGAS, M. D., D. D. S.

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TO

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ARTICLE I.

MONTHLY MEETING OF THE AMERICAN ACADEMY OF DENTAL SCIENCE, HELD AT THE BOSTON MEDICAL LIBRARY ASSOCIATION ROOMS, FEBRUARY 5, 1890.

A PAPER on "Advantages of Using Celluloid as a Base for Prosthetic Dentures" was read by Frederick W. Seabury, Providence, R. I., as follows:

MR. PRESIDENT AND GENTLEMEN,—I shall take pleasure this evening in telling you a few of the good points that I know about celluloid dentures; and get in a few chips at our old enemy, ignorance,—politely called conservatism. I have been wrestling with this subject for the past nine years, with varying success. I guess that I have been on top half the time. Why the Celluloid Manufacturing Company, of all people, should have made machines and published instructions which, when used and followed, reduced celluloid to a soft, porous, colorless mass is beyond my comprehension, but that is exactly what they did. A

dentist who could discover the few good points on working celluloid which are buried in the thirty-six pages of matter on that subject in Richardson's "Mechanical Dentistry," fourth edition, would have no use for them when found. This observation applies with equal force to dental literature in general.

The amount of reliable data on all subjects connected with dentistry, to be found distributed in fragments and buried in dental journals, books, and essays, will astound any one who will take the trouble to investigate. What dentistry most needs to-day is some one capable of condensing and amalgamating facts already recorded. Celluloid as a base for artificial teeth came into general use about 1871, and in 1876 we replaced the last plates we had made with rubber free of charge. There are a few dentists who have worked celluloid successfully ever since it was introduced, but the large majority of dentists discarded it entirely as soon as the Goodyear rubber patent expired, in 1881. The advent of the New Mode Heater and celluloid dentures made in it at the American Dental Association meeting, held in Boston, August 3, 1880, revived interest in celluloid. Of course I ordered a New Mode Heater, which I received the following spring. I worked a month, day and night, without producing a celluloid plate. I did make a black rubber plate with celluloid gum. Then I started for New York City to see the inventor, John S. Campbell. He agreed to come to Providence and teach me what he knew about celluloid for one hundred dollars and expenses, which amounted to another hundred dollars. I have four plates here, two black rubber with celluloid gum, and two celluloid. Campbell made one of each, and I made the others at that time; my celluloid plate has the vitreous surface, his was polished. I then worked a month before I produced another perfect celluloid plate, after that the percentage of perfect plates increased steadily.

I have labored constantly to reduce the process to a mechanical certainty for every dentist who may wish to

work celluloid, and I believe that I have succeeded. The greatest difficulty has been to discover the length of time required to heat the plaster investment up to 315° F. I probably burned and exploded one hundred celluloid blanks, and invested one hundred days' work before that was accomplished. I invented the inclined guide-pin to obviate the breaking of the plaster investment, over the projecting alveolar ridge in front, when opening the flask and when moulding. I made a flask with removable guide-pins to supply the need of a lateral movement which was found necessary when opening the flask. The dovetail lock was invented because plates were liable to burn or become porous if left in the heater after moulding. I journeyed to Philadelphia to inquire if the form of the celluloid blanks could be changed to resemble dental plates and the color varied. The S. S. White Dental Manufacturing Company, which desired the change as much as I did, gave me a letter of introduction to the president of the Celluloid Manufacturing Company, upon whom I waited in Newark, N. J. He told me that the plates could be made any and every shape and color desired, but as they had one hundred thousand plates on hand they did not intend to make any more. I then visited the Zylonite Company, in New York City. I was cordially received, and they regretted very much that we had not met before, for they had hired the same bungling dentist whom the Celluloid Company had employed, and of course they had a large stock of Zylonite blanks which they could not sell. Blanks such as I wanted could be made with one-half of the material, and they felt badly when they realized the mistake they had made.

Nearly all of the failures to make celluloid dentures can be attributed to the form of the blanks. The size, shape, and unequal absorption of the alveolar process, in nearly all cases, centres the whole pressure, when closing the flasks, on the teeth where least material is required, thereby cracking the teeth and investment. Celluloid is

so unyielding that the blank before moulding must be formed so as to exert an equal pressure on each tooth at the same time. As an outlet can be made for the surplus celluloid in the centre or roof of the plate, blanks must be reduced to the thickness required by the denture when finished, otherwise the flask cannot be closed. I now first mould an exact duplicate of the plate desired, so when moulding the second time with the teeth in place the pressure will be equally distributed.

The next point is the amount of pressure required to produce a dense tough plate. After locking the flask, remove it from the press as quickly as possible and place it in a large bench vice, close as tight as possible, and leave it there to become cold. You can easily understand that I was not long in crushing a half-bushel of cast-iron flasks; then I experimented with malleable-iron flasks to the tune of four hundred dollars,—they proved unsatisfactory; brass was too soft, bell metal too hard and brittle. My flasks are now made of bronze a little softer than bell metal.

To make a perfect plate requires a perfect flask. The vitreous surface is dependent on a temperature of not less than 300° when moulding, and contact of the celluloid with metal at that time. The artistic possibilities of celluloid and plain teeth are too evident to need comment.

The advantages of celluloid as a base plate are:

1. The part of the plate covering the hard palate is 1-32 of an inch or less thick, and the labial portion only thick enough to restore the contour of the face, which with plain teeth makes probably the lightest denture in use.

2. It is tough and rigid. I have never seen a broken plate.

3 The vitreous surface protects the plate from the fluids of the mouth, so they are cleaner even than continuous-gum work.

4. Practically the perfect fit of the celluloid plate counterbalances the conductivity of metal plate so far as inflammation is concerned.

5. In color the carved stippled surface, after the tin-foil is stripped off, resembles mucous membrane more than any material now in use.

6. They are easily adjusted to fit inflamed tissues by dipping in boiling water.

7. It is easily repaired without changing the fit.

8. Celluloid moulded by dry heat does not deteriorate or change color.

DISCUSSION.

President Seabury.—The subject is now open for discussion.

Dr. Ham.—Mr. President, I cannot say that I have investigated this matter, or proved it so thoroughly as Dr. Seabury, as I have not given it the time nor spent the money on it that he has, but I can say that I have used celluloid since 1871, and have prepared my cases in both ways,—with the metal dies and by the old method. I think that the method of making it between the metal dies is very much preferable to the old method, as it produces much better results. The old method in many instances left the case somewhat porous, and it would absorb moisture and discolor. But taking it all in all, in the use of both methods, I have never had to make over any more plates with celluloid than I have with rubber, and those plates that I have seen in after years look very well. I first begun to use celluloid in temporary cases, but I found that my patients never came back. I never got any permanent work to do, for the celluloid worked so well that they had no desire to change. I have a patient who is wearing a temporary celluloid plate which I made in 1871, and five or six years ago, while I was doing some other work, the patient was talking of having a permanent set, but I have not had the opportunity to make it yet. It makes a very durable and light denture, and I think second to none when taking into consideration its cost and the artistic result that can be produced in all cases. You can make

just as thin a plate over the gum as you choose, and still it will look very natural and it will be very tough and very durable. Now, in order to produce the same effect with block teeth it would be necessary to grind them so much that they would be very thin and fragile. There is another thing I consider of very great value, and that is, the adaptability of the material to the mouth.

I never have to depress the arch of the plate to make it fit the roof of the mouth, as I have frequently to do with rubber. Celluloid, if exposed to a dry atmosphere, will warp when made in the old way, but with the new process the tendency to come together does not follow; the plate will remain very much as when taken from the metal die no matter how long the exposure, and I have brought here to-night a case which was made for a patient six months ago. The arch was high and it was very hard to remove the case from the die. I do not know whether these three front teeth were broken in removing the plate from the die or not, and my workman did not know, but they were broken off in some way, and so the case was worthless, and I thought I would bring it here, it being a good one to illustrate this matter. You can see that it was a difficult case, on account of the overhanging of the mouth. The plate has been off the die now since it was made, though I have put it on there once to test it. The case was a difficult one to handle, and it would be considered such were it a gold plate, but when I replaced it upon the die it fitted as perfectly as the day it was made, and I think it would now go into the patient's mouth without any trouble. And then the color; even if it does not retain it for any great length of time, it cannot be gainsaid that it is superior to rubber in this respect, as it is certainly very flesh-like. I am not able to compare it with the continuous-gum work, as I have never used any in my practice. My experience in repairing it deterred me from ever introducing it in my practice.

The color of celluloid is good, the texture is not as

dense as rubber, but it is fibrous and exceedingly tough. I remember a partial case of about six teeth, scattered around in various portions of the mouth, which for some reason did not answer. I have repeatedly put my whole weight on that partial set without breaking the plate. I think if I have done so once, I have done so a hundred times. I did finally succeed in bending it with about two hundred pounds pressure.

And then the artistic effect that can be produced with this material, I think, is a very desirable point. The teeth can be arranged to your liking, with the assurance that a satisfactory result will follow in the completed plate. If you employ blocks, the arrangement is too regular,—too mechanical, the teeth are too nice. I could not with carved blocks seem to adapt each case to the individual, but now with these celluloid plates, and being able to use the plain teeth, it is a very easy matter to move a tooth in any direction, and you may be sure it will be just where you placed it, if everything is well done in the laboratory.

Now, there is another point. Dr. Seabury tells me that he does not stipple the gum, because the smooth surface can be kept cleaner and neater than the stippled gum. I have seen but very few of them, however, but what looked as good as new and had nothing upon them but what could be easily removed with a common tooth-brush, a little prepared chalk, or something of that kind.

On the whole, I am persuaded that celluloid is about as good a material as we have to use in our laboratories.

Dr. Eddy.—I have used celluloid for some years, and, being a competitor of Dr. Seabury, I have had opportunity to see a great many celluloid plates which he has made, and I know what he has said is true. But plates made by the old method, not having a vitrified surface, do not hold their color, and are not as durable as those made by Dr. Seabury.

Dr. Chandler.—I would like to ask Dr. Seabury if he uses a metal die or a hardened plaster cast?

Dr. Seabury.—A metal die, always.

Dr. Fillebrown.—What metal do you use?

Dr. Seabury.—I use tin mostly.

Dr. Chandler.—Did you find any trouble in the use of tin in filling the mould? You cannot make a sharp casting with it.

Dr. Seabury.—I have not experienced any trouble of that kind. We mould them in sand the same as we do zinc.

Dr. Fillebrown.—I have been much impressed with the remarks of Dr. Seabury, and am much more interested in the subject than I expected to be. The excellence of the work shown here is very marked. I used celluloid considerably in former years, but returned to the use of rubber, as that seemed to serve me better. I used tin dies for the palatal and lingual surfaces of the plates and got a very fine hard finish, but I did not coat the labial gum surface with tin as has since been done, and probably that was the great reason why I laid celluloid aside. There is one other point brought out in this discussion worthy of consideration,—that is, the merits of plain teeth over gum sections for artificial substitutes for natural teeth. I consider them very much superior in every way. For nearly twenty years I have used scarcely a set of gum teeth unless by command of my patient. I agree with Dr. Ham that plain teeth are best because more easily arranged in the mouth according to the artistic requirements of the case. Or, to state it stronger, plain teeth can be arranged artistically while gum teeth cannot, but must submit to predestined rigidity. As each plain tooth can be moved separately, the personality of the patient will assert itself, and an individuality will be obtained not possible with gum sections. At one time I was in the habit of carving models for teeth in wax, arranging them in the mouth and having gum sets carved for cases. But though the carved sets were far better than the moulded gum sections, they all came back with a monotonous sameness, very objection-

able. The plain teeth with pink rubber for gum afford myself and my patients great satisfaction. By using teeth a little longer than natural, but not enough so as to be noticeable, the gum will show but little if any, and the case will look a thousand times better than if made with the rigid sets of gum teeth.

Dr. Banfield.—Mr. President, I had occasion to make a set of teeth a few days ago where the upper jaw was very prominent, and finding that if gum teeth were used the lip would be thrown too far out, I decided to use celluloid made by the Seabury process. It was particularly advantageous to use celluloid in this case, because the labial surface of the plate required to be very thin, and the use of celluloid assisted in arranging the teeth to look more natural. When the plate was finished the material looked good and firm and I was well pleased with it.

Dr. Codman.—I would like to ask Dr. Seabury what blanks he uses?

Dr. Seabury.—They are all White's.

Dr. Ham.—If you remember, soon after the introduction of this material, the works of the Celluloid Company were destroyed by fire, and the stock they had on hand was either burned up or ruined. Then there was quite a demand for it, and the company was induced to immediately enter upon the manufacture of it again, and the consequence was they placed upon the market a material that has not been thoroughly seasoned. What we are getting now is very much better.

Dr. Williams.—I wish to ask Dr. Seabury in regard to the non-warping qualities,—whether it is liable to warp?

Dr. Seabury.—This set of teeth has been lying on the bench and has been exhibited for nine years. There has been no shrinkage or warping. They are moulded at such a high degree of heat, 315° F., that the tendency to warp is overcome.

Dr. Andrews.—I would like to ask Dr. Seabury if the blanks are any better now than they were before in regard to the shape?

Dr. Seabury.—They have not been changed. Celluloid has almost gone out of use nowadays, and they had such a large stock of blanks left on their hands that they refused to make new dies. They realized that they were two or three times as thick as they need to have been, and of course it would have been a great saving to them if they had been made the right thickness. As they are, they have to be scraped to the required thickness.

Dr. Fillebrown.—Do you make new moulds each time?

Dr. Seabury.—We mould a plate every time. First scrape the roof,—scrape it down to the thickness you want it,—then mould it, and then it is ready to put the teeth on, all of which could have been avoided if the blanks had been made the right shape.

Dr. Banfield.—There was one thing which I wanted to ask Dr. Seabury, and that is, if he had seen any plates that had been worn for a year or two and then laid aside?

Dr. F. N. Seabury.—I can answer that question. About a year or so ago a lady came to our office who had been wearing a celluloid plate for five or six years. The plate was all right in every respect, but she wanted to have a gold one made. We have that plate now, and it is just as perfect as it was then.

Dr. Banfield.—Have you ever tried it in the mouth?

Dr. F. N. Seabury.—We have never had the opportunity, but Dr. Ham's demonstration is pretty conclusive on that matter. I think it does not change.

Dr. Baker.—I should like to ask Dr. Seabury if he has ever had any difficulty in removing the plate from the metal die?

Dr. Seabury.—No, sir. You can do that every time by immersing the plate with the tin die in a basin of cold water; then hold the basin over a gas-burner, and the flame striking the bottom of the basin will beat the die; before the water boils, the plate can be easily removed. In this machine (the Seabury celluloid machine) a celluloid press and heater are reduced to the simplest form. The ad-

vantage of this little press is that the operator has perfect control of the case through each stage of the process. I can tell by touching my finger to the tin die how hot the plaster is. It is the heat from the plaster that moulds the celluloid. The flask should be put in bottom side up, turn the gas on, and leave it in there an hour and a quarter at a temperature of 320° F. Then mould. The flask will close in from four to five minutes. Then remove it from the press as soon as possible, so that it will not burn or become porous. This can be done very readily. The flask when it is heated up to that degree of heat is pretty hard to handle, but the door is large enough so that you can get the flask in and out quickly without burning yourself. I have not had an imperfect case since I have used the heater. I am more sure of the product than I would be with rubber.

Dr. Baker.—Do you use the metal always?

Dr. Seabury.—The metal must come in contact with the celluloid or you don't get a finished surface. You get the same effect by covering your plaster with tin foil. The only way you can tell how hot your investment is, is by the siss of the tin die.

Dr. Chandler.—Tin is a very soft metal, and when it is heated to something like 300°, it will take the impression of almost anything. In the manufacture of vulcanite plates, it will take every impression of the mould.

Dr. Seabury.—I have never seen more than one or two softened in nine years. In the case of a very narrow alveolar ridge, I would not trust the tin, I would use bronze.

Dr. Fillebrown.—How would Babbitt metal do?

Dr. Seabury.—I don't know. I have never used it.

Dr. Fillebrown.—I think that Babbitt metal melts at a lower degree than this.

Dr. Chandler.—Oh, no; between tin and zinc.

Dr. Williams.—I would like to ask Dr. Seabury why he does not use zinc?

Dr. Seabury.—I do use it occasionally, but it is more

apt to shrink. We mould these tin dies very thin, and it is hard work to get a suitable mould from zinc. The shrinkage takes place right in the centre of the roof and you get a hole there.

Dr. Fillebrown.—I would like to ask if there is considerable celluloid used?

Dr. Seabury.—I should judge there were about half a dozen dentists who use it in New England, but I should say that in comparison with the number of dentists in the United States they do not make much of a showing.

Subject passed.

President Seabury.—Dr. William Y. Allen will present a new method of obtunding sensitive dentine.

Dr. Cooke.—Mr. President, Dr. Allen was not able to be here to-night, so he left the machine at my office, and I will endeavor to tell you all I know about it.

I understand, Mr. President, that this appliance is not new to Providence dentists. It had been used there for some time, and it consists of three parts,—a little alcohol lamp, a little boiler in which steam is generated, either from water or alcohol, and a little tube, about ten inches long, to convey the steam to the desired point. The amount of the steam is regulated by a stopcock. I tried the device on a brother dentist with pretty fair success. Also upon another case in which the secretions were in a very acid condition, and where I had had some difficulty in excavating. I started this flame,—the steam gets up in a few moments, and, carrying this tube into the cavity, and allowing it to remain there a few seconds, I took an excavator and cut the decay out without pain.

I presume, Mr. President, that some of the Providence gentlemen can tell more about it than I can.

Dr. Eddy.—I suggest that Dr. Cooke light the lamp. All I know about it is that it was invented by a gentleman by the name of Small, and a dentist of the same name has been using it since last February. Dr. Cummings, I know, has personally used it.

Dr. Cooke.—This is alcohol in the boiler here. When first used I believe they put in water.

Dr. Williams.—Do you suppose that alcohol is better than water?

Dr. Cooke.—Yes; steam can be produced at a lower degree of temperature.

Dr. Fillebrown.—I would like to ask Dr. Eddy if he has seen any cases in which the use of it has been injurious?

Dr. Eddy.—Not at all. I have talked with one of Dr. Small's patients,—an intelligent gentleman, who has a very sensitive organism. He was very enthusiastic; having had buccal cavities filled with little discomfort, when formerly the pain was unbearable.

Dr. Potter.—What is the temperature of the steam?

Dr. Chandler.—If water is used, the boiling point would be 212° F.; if alcohol, about 174° F.

Dr. Potter.—What would be the effect if the hot steam were to come in contact with the pulp of the tooth?

Dr. Eddy.—Mr. Lippitt, the gentleman who spoke to me about it said that it could be put right onto an exposed pulp without any discomfort.

Dr. Pond.—Have you got to put the point of the tube right onto the dentine?

Dr. Cooke.—I understand it has got to be very close.

Dr. Williams.—Is the operation done while the tube is in the cavity, or immediately after?

Dr. Cooke.—You hold it there fifteen or twenty seconds, remove it, and commence excavating.

Dr. Taft.—I would like to ask Dr. Cooke if he considered it worked successfully on the two patients at the meeting of the Harvard Odontological Society?

Dr. Cooke.—In those cases the success was not marked, but that proves nothing. Clinics are not always successful.

Dr. Fillebrown.—I would like to ask Dr. Eddy, or some one who has had experience, if he thinks the sensi-

tiveness is obtunded by the resorption of the moisture from the tubules of the teeth?

Dr. Eddy.—I would say, Mr. President, that I have had no experience whatever. Dr. Cooke has used it personally and can tell you more about it than I.

Dr. Cooke.—I should hardly think it was caused by the resorption of moisture, as, after using the steam, we must dry out the moisture which is condensed in the cavity before excavating. This is not so when alcohol is used.

Dr. Niles.—I want to say a word in regard to this steam obtundent. It was called to my attention a month or six weeks ago, and from my knowledge of its use in Dr. Allen's hands and my own experience with it, I am inclined to think there is some merit in it. I had yesterday a very good chance to test it, and I sent to Dr. Allen's office and obtained the use of it. The case in hand was the fracture of a superior central incisor of a young lad about twelve years of age. The tooth was broken about one-third the way up, and, in order to piece it with porcelain, it was necessary to smooth down considerable of the dentine. I used the steam and it certainly worked very well indeed. I found that after grinding off a little dentine, it was necessary to apply it again, and so by alternately grinding and applying the obtundent I was enabled to complete the operation, giving the patient little pain. In that operation it was certainly successful, and I for one do not feel like passing this matter over so lightly.

Dr. Eddy.—Dr. Allen has used it a great deal, and says that his patients would not think of having an operation performed without it.

Dr. Fillebrown.—The principle is good and there is no doubt it can be improved on. The boiler can be made to throw medicated solutions for various purposes, as is now done by the steam atomizer in throat diseases.

Dr. Cooke.—Dr. Allen made a step in advance by using alcohol instead of water.

Dr. Taft.—Isn't it liable to destroy the pulp?

Dr. Cooke.—It struck me in rather a ridiculous light when I first saw the machine, as it seemed as if it would surely cook the pulp, but by judicious use I do not believe this objection will be a serious one.

Dr. Taft.—How much of the tooth does it affect?

Dr. Cooke.—I find that two thickness of common note paper is about the depth that the dentine is obtunded.

Dr. Fillebrown.—I should say that if it was obtunded half the thickness of one sheet of note paper, it was a perfect success.

Dr. Baker.—I think myself this thing is worth investigating if nothing more, and I for one would like to try it. My attention has been called to it several times lately through my patients; if it has merit we have got to have it; if it has not, it will die a natural death.

Dr. Codman.—I saw the explosion here this evening, and I would not have such a thing as that happen in my office for five hundred dollars. I don't think any dentist here would. We all know how unwisely people will act when they come into a dentist's office,—how they will do the most extraordinary and unexpected things, and how careful we have to be so as not to shake their confidence in us. I do not see the necessity of having the lamp placed near the patient's mouth, for accidents in its use would be fatal to the confidence of our patients.

Dr. Niles.—I think Dr. Fillebrown is in a position—being at the school—to make a thorough test of this apparatus, and I am sure the inventor will be very glad to loan one to the Academy for the purpose of investigation. It seems to be a risky thing to be experimenting with in ordinary practice until we have had some instruction in the use of it from some one who has had experience, and in the clinic there are plenty of exposed pulps and opportunities for experimenting that we would not have in our offices.

Dr. Banfield.—I will ask one question which I think might be very interesting, if those gentlemen who have

used it can answer it, and that is, if they have themselves, or any one else, tried to destroy a pulp that they wished to remove, with this instrument.

Dr. Eddy.—I have never heard it spoken of as used for that purpose.

Subject passed.

Dr. Banfield.—The S. S. White Dental Manufacturing Company have kindly sent me their Howe Fissure Chisels to be exhibited to the society. Also, the Perry Dental Engine, which you will please examine.

Dr. Ham.—If there is no other business to come before the society, and the exhibition of dental appliances is now in order, Mr. President, I would like to exhibit a method of adjusting a rubber ligature to a regulating case. I have never seen it used by any one else, and I think it is original,—still it may be very old. Most of us are accustomed to using buttons, hooks, etc. I simply make a hole of proper size through the rubber plate, and on the palatal surface I countersink with a square ended bur. I then take a silk string and pass it through the loop and pull the end of the rubber ring through the rubber plate, and the resilience of the rubber will fill the countersink in the plate and hold the ligature firmly, I then clip the string off even with the plate and leave it in the loop.—*Independent Practitioner.*

ARTICLE II.

CHANGES OF THE ORAL SECRETIONS.

BY G. T. THURER, U. OF M.

A thorough knowledge of the fluids of the mouth is indispensable to the dentist if his aspirations look higher than the mere insertion of artificial dentures, or the filling of teeth, as they of necessity mingle with and lubricate our

food, and exert an appreciable influence over digestion, and all of them may, in disease, materially interfere with this physiological function.

Moreover, none of the secretions of the alimentary tract have a higher claim upon the attention of the dentist, looked at from a physiological or pathological stand-point, than the saliva, as it is claimed to be the fluid, which, when abnormal, assists, if it does not produce, caries of the teeth. The properties and characteristics of the oral secretions, though not included within the limits of this subject, will be briefly considered.

The saliva is composed of the secretions of the parotid, submaxillary and sublingual glands, also of the mucous follicles.

The parotid saliva is a clear liquid, not viscous, and slightly alkaline. It gives no reaction for mucin, but contains albumen, ptyalin, and among the more or less peculiar constituents we find paraglobulin, caporic acid, urea, and traces of sulphates. The reaction of the first secreted parotid saliva is less alkaline than that secreted later. On standing, the parotid secretion becomes turbid, owing to the escape of carbonic acid and the consequent precipitation of calcium carbonates.

The submaxillary saliva differs from the parotid saliva in being more alkaline, and from the presence of mucus, more viscid; it contains, often in abundance, salivary corpuscles and amorphous masses of proteid material. The character of submaxillary saliva depends upon the exciting stimulus to its secretions; stimulation of the chordatympain nerve causes a normal, rich, alkaline secretion, as noticed when acids are applied to the surface of the tongue, but in it no ptyalin is found; with long-continued stimulation the organic solids diminish somewhat, though at first the mucin is slightly increased. Stimulation of the sympathetic nerve supplying the gland, or an application of pepper or alkalies to the tongue, produces a strongly alkaline secretion of high specific gravity (1.007 to 1.018) but

viscid, turbid, slowly-flowing, rich in mucus, and irregularly formed cell elements. In paralysis of the nerves supplying the gland very watery saliva is found containing little solids or mucus. This variety is known as paralytic saliva. The submaxillary saliva is more alkaline and viscid than that of the parotid and its average specific gravity is from 1.002 to 1.003. It contains much more carbonic acid than venous blood but is poorer in nitrogen. The sublingual saliva is very viscous and thready, strongly alkaline, rich in mucus and salivary corpuscles, and would appear to be the richest in solids of all salivas. Traces of cholesterin and fat have been found in it. The secretion of the mucous follicles is a mucus which is viscid in character, grayish in color, and contains, when free from admixtures with other secretions, epithelial cells and leucocytes. Its reaction is, according to Claude Bernard, alkaline, but when normal becomes markedly acid. The physical characteristics of mixed saliva are that it is tasteless, colorless, odorless, specific gravity 1.002 to 1.006, reaction is alkaline, appearance is generally turbid, consistence glassy and frothy. On standing for some hours in a cylindrical glass vessel an opaque, whitish deposit collects at the bottom, while the supernatant fluid becomes clear and of a faint bluish tint.

The secretion of saliva is not constant, even normally. Its secretion may be excited by the sight or even thought of food, especially when hunger exists; by the movements of mastication—the secretion of the parotids alternating the parotid of the side on which mastication is going on, secretes at least one third more than that of the other side, and when mastication is changed to the other side, the corresponding parotid goes vigorously to work, while the action of the first partially ceases. Secretion is also increased by vapors of ether or acetic acid, or by electrical stimulation. Nausea will generally excite a free flow of the buccal fluids; at such times the mucous follicles or glands become especially active.

The various mental conditions operate variously upon

the salivary glands; fear diminishes the secretion very much; fright may check it entirely; anger also diminishes it, while good humor and mirth increase the secretion. Erotic emotions increase the secretion of the mucus considerably, and that of the saliva to some extent. Grief augments the secretion of saliva and mucus. Fluctuations in the quantity of water in the blood has but little influence upon the amount of saliva elaborated in a given period. Neither does it change the relative proportions of the solid constituents of the saliva. Dry food also acts as a stimulus, and increases the amount of secretion to a much greater extent than food containing moisture. There is also an increase in quantity when patient is suffering from debility, confluent small-pox, ague, hysteria, facial neuralgia, and organic diseases of the stomach or abdominal viscera. The action of certain drugs will also produce this effect, and chief among these we have mercury, pilocarpin, eserin, iodide of potassium, etc. During dentition, the first indication of the advance of the teeth is an increased flow of saliva—a healthy manifestation, as it serves to keep the mouth moist and cool. The increased flow of saliva, called "drooling," is doubtless due to irritation of the tri-facial nerve, which is sensory to the teeth and nutrient to the salivary glands. Pregnancy, a purely physiological function, giving rise to repeated vomiting and capricious appetite, disturbs the buccal fluids to such a degree that a rapid decay of the teeth is observed as a consequence.

The saliva is subject to many and great changes by disease. The saliva, proper, may be changed from its natural to a definitely acid secretion, or it may be changed to more than its alkaline condition. This latter is exhibited when salivary calculus is rapidly deposited upon the teeth. Any change of the mucus is usually to an increased acidity. When this condition is produced to such an extent that it is not neutralized by the saliva, as is generally the case when green stain is deposited upon the teeth, it becomes a source of mischief.

The saliva becomes changed to an abnormal or diseased condition in two ways; first, by a vitiated state of the blood, and second, by a diseased condition of the glands themselves; the latter is often complicated with the former. The saliva, proper, is more frequently affected by a deteriorated state of the blood, but the mucus by an unhealthy or diseased condition of the mucous follicles. These latter being situated in the mucous membrane, near the surface, are more exposed than the salivary glands to the influence of local irritating causes. The salivary glands are often required to perform more than their natural amount of labor, sometimes from local causes or stimuli, as in the use of tobacco or other similar agents; from constant use of jaws in mastication, and from general constitutional causes, as in ptyalism and in various vitiated conditions of the blood. When any organ is overtaxed its production is necessarily deteriorated. It is a well known fact that when the saliva is neutral or slightly alkaline caries of the teeth is at a stand-still, and when the reverse is the case decay is progressing more or less rapidly, depending upon the character of the secretion. Simple calciferous saliva, of itself, does not particularly harm the teeth, but the latter complications are not to be so characterized; in addition to covering a portion of the teeth with calculus it may give rise to ranula and catarrhal inflammation of the gums, which latter disease, if allowed to care for itself, permits tartar to be deposited, even on the apex of the root of the tooth, causing neuralgia, but before the latter complication the whole secretion is changed by becoming profuse in quantity and excessively alkaline in its reaction, denoting disturbance of the nervous equilibrium. Saliva presents the same reaction during putrid fever and purpura hemorrhagica. Pending the formation of an alveolar abscess up to the climax of pain, the saliva is abundant and the reaction alkaline or neutral, but afterward it becomes acid until the subsidence of the swelling, when it once more becomes normal in quantity and quality.

While in general the saliva may give an acid reaction as the result of inflammation of the gums, we do not look to it, but to the hypersecretion of mucus as the cause of such reaction. The acute diseases causing hypersecretion of mucus are acute stomatitis, bronchitis, pneumonia, pharyngitis, pleurisy, and acute enteritis, while those of a chronic nature are marsh-fever, dyspepsia, gastralia, dysentery, etc. The mucus secreted is not of itself to be feared in these affections, but by increasing the flow of saliva by the use of remedial agents, there is a large amount of ptyalin present, which, in conjunction with the mucus, furnishes an active ferment, producing from azotized substances, as secondary reactions, butyric, benzoic, valeric and other acids destructive to the teeth. In simple gastric disorders, saliva is changed to an acid condition, which may be accounted for by increased tissue metamorphosis, the epithelium of glandules being cast off so rapidly that a chemical change takes place in the cells causing the secretion to appear acid.

In febrile diseases the secretion of the saliva is very much diminished, and sometimes checked altogether; then the secretion of mucus being kept up, the teeth suffer injury, for the mucus at such times is always in a vitiated condition and changes rapidly to a worse condition while in the mouth. The water evaporates and leaves a thick, tenacious sordes covering the teeth and lining the mucous membrane of the mouth. This condition also facilitates the decomposition of foreign material that may be brought in contact with it.

Saliva is very copious, frothy and alkaline in apoplexy, hysteria and hydrophobia. We can find parasites in the saliva constantly—as the thrush fungus in infancy, and in the wasting diseases, as tuberculosis, also micrococcus dentalis in whooping-cough, and leptothrix-buccalis, vibrios, and bacteria are found at almost any period. The latter stimulate the nitrogenous remains of food to putrefactive fermentation, yielding lactic acid from sugar, etc. This

acid is present in saliva in gout, rheumatism, intermittent fever, and diabetes; acetic acid in scrofula, small-pox, scorbutus, and aphthæ; hydrochloric acid from the immoderate use of animal flesh, including salt meats, galvanic action, and in the earlier stages of inflammation of the oral mucous membrane there is an increase of the soluble chlorides, which, when under favorable conditions, decompose, liberating the chlorine, which unites with the hydrogen present to form the above acid.

Saliva is changed to fetid condition in cancrum oris and syphilitic ulcerations, and is usually acid in reaction in catarrhal inflammation, cutaneous diseases, and venereal affections; the gums in the latter are always softened and spongy unless mercury has been exhibited. In mercurial salivation and iodism as much as two per cent. of inorganic matter with a large quantity of coagulable material have been secreted, the latter decomposing rapidly when lodged between the teeth, and presenting an acid reaction.

In diabetes there is atrophy of the glandular organs of the mouth, throat and gums; saliva strongly acid, and the mucous membrane most likely to be the seat of scorbutus. Ammonia and sulphuretted hydrogen are nearly always present in the saliva of unclean mouths.

It is not to be wondered at that caries of the teeth should be so prevalent when it is remembered that no disturbance of the human system prevails, for even a short period, without changing the character of the oral secretions. The various acids, organic and inorganic, coming in contact with the teeth as ailments or remedial agents, or as the result of fermentation, which latter is favored in proportion as the saliva is scanty and the mucus abundant, renders it necessary for the dentist of to-day and his future successor to be a student of chemistry and hygiene—a preserver and master of the laws of health.—*Dental Register.*

ARTICLE III.

SOME PRACTICAL POINTS LEARNED AT SOCIETY MEETINGS AND CLINICS.

BY DR. B. A. R. OTTOLENGUI, NEW YORK CITY.

[Read before the Brooklyn Dental Society, December 25, 1889.]

EXPERIENCE is the best teacher. However thorough the college training may be, or become, no man will ever graduate with as much practical knowledge as will come to him by actual work at the chair. If experience, therefore, is a great teacher, and each man is taught by different experiences, it must be a fact that different men learn different methods of accomplishing the same thing, and also learn to do different things. What then can be better than meetings and clinics where these differing methods may be exhibited and discussed? Suppose we read on a programme, "Dr. A——will fill a tooth with gold;" must we say, "We can learn nothing there, we all know how to fill teeth with gold?" That would be a great error. We may learn nothing, but then we may learn something, and that possibility makes it to our advantage, if not our duty, to attend that clinic. It is almost impossible to go into the worst-appointed dental office without seeing something new, or at least different from our own methods. We are all students, and at the same time we are all teachers. We should be willing in both parts.

To-night I have to offer you a brief but practical paper. I think nothing in it is entirely original with myself. I suppose that there is not any idea in it which some of you have not heard before, but I doubt if there is any one who can say, "I knew them all;" and if each man gets but one new idea to-night he will be repaid. These little methods have been extremely valuable to me, and I could not dispense with any one of them.

I will begin with the rubber dam. Probably no dentist

will admit that he is not master of so simple a thing as the rubber dam, and yet how often does the dam become the master of the dentist merely because some unforeseen accident occurs in the midst of an operation. There is the tiniest tear through which mucous will ooze; the dam did not pass entirely down between the teeth, and moisture is creeping towards our work; the clamp slips; we have not allowed quite enough margin to the rubber to cover the mouth; we thought we had, but when we applied the clamp we discovered our error, and so on *ad infinitum*; through some little oversight we have failed in that seemingly simple operation the application of the dam. So much annoyance has occurred in this manner that perhaps you will pardon me if I think it important enough to tell you all the little tricks which I have learned in this connection.

For comfortable work, the rubber, when in position, should embrace at least four teeth; on dark days it is not amiss to take in twice as many. It should lay over the face without a wrinkle, and should not cover the nostrils; it should, however, completely cover a moustache, as the hairs often intervene between our eyes and work. To accomplish this a piece of dam of sufficient size should be stretched over the parts which it is intended to cover, so that the proper position for the holes may be ascertained, allowance being made for the stretching which will be made by the clamp. In this position the cusps of the teeth will show through the rubber, and a mark over each may be best made with an excavator, a pencil not answering as well. If because of the loss of a tooth a space must be spanned, the rubber should not be stretched at that point; if this is not considered it will be found that when the dam is stretched over the teeth it will not hug the necks of the teeth at this point. In fact, this rule holds for all spaces great or small; the rubber should be wide enough. In cutting the holes use a device which makes a perfectly round hole, this being the least likely to tear. Make the holes sufficiently large; don't force a molar through a hole

which would be just right for a bicuspid. Where the teeth are in close contact, soap a bit of waxed floss silk and pass it between all the teeth first; then soap the edges of the holes in the dam; in this manner there is seldom any difficulty about forcing the rubber between the teeth. Occasionally, even this will not serve. Your predecessor (of course not yourself) has left a filling with ragged edges, which tear the rubber. In this case the teeth in question should be wedged with soaped wood, as will be described later. The least spreading allows the rubber to pass between, when the wedges may be removed. This is better than trying to force the dam between the teeth with silk. That method not unfrequently tears the rubber, and accounts for the mysterious oozing which occurs whilst the filling is in progress, and is largely responsible for the failure so often reported at the cervical border. If the dam has been properly adjusted, it can be removed in perfect condition. How often have you noticed, after removal, that in addition to the holes made by your punch there are several others, satellites, as it were, about the greater orbs.

Next comes the clamp. In the first place select the one to be used before applying the dam. Choose one which will grip the tooth tightly. Throw away all clamps which would not hurt you if put on your finger. A clamp without a spring is no better than a clock in the same condition. In applying the clamp to a molar in the upper jaw a little trick is found to be most valuable. We begin by slipping the rubber over a central incisor, then over the lateral cuspid and bicuspid, and finally over the first molar, let us say. We endeavor to apply the clamp and find little room, and the patient flinches. The cause is this: The middle finger is the one we use to adjust the dam; it protrudes into the mouth, and as we work towards the molar region we gradually fold the angle of the mouth inward so that at last it is held back by the tip of the finger, and it is difficult to find room for the clamp. Just at this point, take the handle of a burnisher or other in-

strument and free the check so that the finger passes into the mouth, the check slipping forward, then it will be found that, not being crowded back, its elasticity gives us sufficient room to apply the clamp without pain. This one point has been of inestimable value to me, and to my patients in saving pain.

Before passing to ligatures there is a special case to be alluded to. Where the gum has receded and a large festooned cavity is present, the space on either side of the hole which is to embrace the tooth to be filled should be wider than ordinarily made; otherwise, when stretched so far up on the gum, there will be leaking about the edges. Ligatures should be dispensed with as much as possible. They are frequently the cause of more pain than any other part of an operation. It is rarely necessary to ligate more than two teeth, and frequently no ligature at all is needed. The trick is done by inverting the edge of the rubber so that it slips under the margin of the gum; if the root is at all conical, the elasticity will cause the rubber to crawl up and tuck itself under nicely. If a ligature must be used, a little cocaine is useful. There will come to us cases where the ligature is absolutely necessary, and where it seems almost impossible to place it so that it will not ride up around the crown rather than remain at the gum margin. Let us suppose such a case in connection with an upper lateral incisor. The cavity is in the palatal sulcus, therefore the ligature must be forced up. The trick is to tie a good knot in your silk first; placed about the tooth, this knot must come at the centre on the palatal side; it makes a good point of resistance for the instrument, and is pressed up under the margin of the gum, carrying the rubber with it; the gum contracting holds it, and when tightly tied on the labial side holds securely. This is the first point I ever picked up at a clinic, and, as I have never seen it at one since, I would have lost a great deal of satisfaction which it has brought me had I been absent from that clinic.

I alluded to leaking. In a very wet mouth, after the best precautions, ligatures well placed, it will sometimes happen that moisture will creep in around the neck of the tooth. Take a piece of spunk, dip it in gum sandarach, being careful not to get an excess, and pack it in a rope around the neck of the offender. Then apply a second ligature which shall tie the spunk in place. The leak will be stopped. If an instrument has slipped and torn a small hole, it may be stopped with a bit of sponge dipped in sandarach. Where the leak is about a clamp, the clamp should be taken off carefully, a fairly large piece of spunk, treated as described, placed along the edge of the rubber, and the clamp reapplied so that it bites the middle of the spunk holding it in place. As to the slipping of a clamp, it sometimes occurs because the dam is held too tight by the rubber strap which passes around the head, or there is a strain from the dam weights.

In some cases it will be found impossible to apply the dam at all. There is a way of using the napkin which may not have occurred to all. A small mouth napkin is rolled into a narrow fold, and placed about the tooth in the shape of the letter "U," the ends forward. It is so arranged that the folds extend slightly upon the sides of the tooth where it is firmly held in place with a clamp. There is a special clamp made for this purpose by Dr. Ivory, but any clamp of suitable form will answer.

There are a few points about oxyphosphate fillings worthy of note. We have all noticed that what is left on the mixing dish is usually more adherent and harder than what we put into a cavity. Both these facts depend on circumstances which are usually absent in the mouth. To make a dense filling it should be allowsd to set thoroughly before the dam is removed, and moisture should be excluded for at least twenty-four hours. This may be accomplished by using a coating of chlora-percha over the finished surface of the filling. If the dam is left on until this varnish has hardened by the evaporation of the chloro-

form it will not wear off for a week, and I have known it to last two months. Such fillings are comparatively permanent. Where we wish to utilize the sticking or cement quality of this material, the best result is obtained by first lightly coating the surfaces with the liquid. This is why the material is so adherent to the slab. I have thus cemented regulating fixtures to teeth, and at the completion of the work found it troublesome to detach the cement from the enamel after the fixture had been forced off.

In teeth which are sensitive, and where a good general shape to the cavity is present, do not make a retaining pit or groove for starting the filling. I am aware that some of you will say, Never do so under any circumstances. But possibly you preach better than you practise, and you may make such a pit or groove tomorrow if you find it more convenient. In sensitive teeth, whether the pulp be nearly approached or not, a coating of oxyphosphate between the filling and tooth is an advantage; place it there and then press gently two or three pellets of gold into it, without attempting to condense them. When the cement has set, carefully chip away such portions as have crept over the edges, and the gold thus cemented to the tooth forms the very best starting-point. Of course amalgam may be used similarly.

Gilbert's temporary stopping is furnished us in two colors, red and white. At the first glance it would seem that the white is to be used in the front of the mouth and the red out of sight. The difference in color can be better utilized than that. Use the red to cover arsenic dressings or in any place where immediate continuance of treatment at the next sitting is imperative. Use the white for teeth in a comparatively safe condition. In this manner, as soon as the mouth is examined, the observance of the red filling is as a danger signal, and calls our attention to the fact that there is something which may not be postponed.

A gentleman said at one of our meetings recently, "I have several kinds of separators; I could not get along with

only one." I made a mental note at the time that this was odd, because I get along without any. I think the separator is a dangerous instrument. It is in rare cases only, where good and sufficient space may be thus acquired, and in unskillful hands, especially young practitioners, the probability of failure at the cervical border is, in my opinion, increased tenfold. If a tooth is to be filled, the first and most important point is that the completed filling shall be perfect. There are few men who can put in as good a filling in a space barely admitting an instrument, and there are fewer still conscientious enough to do it, even granting them the skill. The best teaching then for the young, and I think for the old as well, is to depend on the rubber or wooden wedge. There is a trick in the application of each. When using rubber allow a bit of it to protrude below the cutting ends of the teeth. This part, by contraction as the teeth move, will swell, and the rubber is prevented from pressing up against the gum. To apply the wooden wedge, proceed thus: The wedge is trimmed to the proper width and should approach a taper very gradually. If it is then made smooth with a bit of sand-paper it will be less likely to split. Lastly, it should be soaped. A second wedge should be made quite thin, and have a shoulder which will prevent it from passing between the teeth beyond that point: This, also soaped, is placed between the teeth next to the gum temporarily. Now, when the permanent wedge is forced into position, this one first placed prevents it from hurting the gum and offers a slippery surface for it to slide against. The wedge in place and trimmed to suit the temporary slip is removed, and this relief of pressure against the gum is gratefully acknowledged by the patient. At the next sitting, supposing the teeth separated but quite sore, gutta-percha should be placed between them and worn for several days. There is a neat trick about this. If the material is softened it is frequently difficult to fix it tightly in space. Cut a piece from a sheet and press it into place cold, then smooth and trim into shape with warm burnishers.

Occasionally, in soldering, a portion of our investment breaks off, exposing a part of a tooth. We can ill afford the time to patch the break and wait for the plaster to harden again. The exposed portion of the porcelain may be perfectly protected by covering it with a thick paste of chalk and water. This mixture may also be used to fasten small pieces of gold to the solder-block while soldering.

You all have seen artificial dentures where, after brief wearing, the front blocks separate, the plate finally breaking in half. To avoid this, permanently unite the blocks by soldering a platinum bar to the pins. To do this, after the teeth are ground to proper position, make a guide with plaster along the outer surfaces and then take off the front blocks. They are set into position in this guide, waxed together and invested, when the soldering may be done, the blocks dropping back into proper place.

There is nothing better than the pins from old teeth, soldered to a gold plate, for securing rubber attachments. The graving of a plate or even punching holes is a delusion and a snare. The rubber will separate from the plate some day. The prettiest and strongest plate is made with what we know as "celluloid" teeth, soldered to a gold plate and then rubber vulcanized around them. The plate teeth are not made in as good moulds.

Don't varnish plaster impressions. Soap the surfaces with a shaving brush. Be careful to wash off the suds, or the model will be pitted. Put a little red paint in the water when pouring your model, and in separating, the model is easily detected, by its color, from the impression.

Occasionally a gold plate is brought to us with a tooth broken off, the pins of course remaining in the backing. It may be that a good match cannot be found, or you may be in a hurry, so that you wish the same tooth could be used. Proceed as follows: Boil the tooth in acid to get the stump of the pins remaining as clean as possible. Invest it as for a backing. Lay a bit of pure gold over each broken pin and point a fine flame with the blow-pipe till a

tiny gold ball is made on each broken pin. These may be filed up and will be sufficiently long to allow backing the teeth, using platinum foil and gold of a lower carat.—*Independent Practitioner.*

ARTICLE IV.

A STUDY OF ELECTRICITY, WITH THE VIEW OF COMPREHENDING ITS APPLICATION IN DENTISTRY.

BY HOWARD E. ROBERTS, D. D. S.

[Read at the twenty-first annual meeting of the Pennsylvania State Dental Society, held at Cresson, Pa., July 30, 1889.]

In preparing this paper for your consideration I have found it difficult to express my ideas without defeating the object for which it is written. To those who have given the subject much study, or who are practical electricians, my paper will be of little interest, but as it is to those who are not so well posted in the subject that I wish to address my remarks, I trust you will pardon me if I repeat what you are already familiar with. It is difficult to understand and remember if we do not know and see the reason why; therefore, I will try to explain some of the laws and define some of the terms used, making use of as few technical terms as possible, and defining those I have to use.

In many ways electricity may be compared to a stream of water, and, as we can see and measure the water, it makes it easier to understand and appreciate the laws which govern the electrical current. One difficulty which many have in trying to understand many of the terms used in connection with electricity comes from the impossibility of being able to see and handle,—you might say there is nothing tangible to work from.

In order to speak intelligently about electric currents,

there are three terms or words the meaning of which it is necessary to understand. They are the Volt, the Ohm, and the Ampere, and they are so related that by Ohm's law, if any two are known we can determine the third. The volt is the unit of pressure, the ohm is the unit of resistance, and the ampere is the unit of volume or quantity.

In defining these terms I will first take the unit of resistance. If it were water or steam we were considering, we could say that the unit of resistance would be the resistance offered by a pound weight, and with water flowing through a pipe the resistance would be the friction of the water against the sides, which would be represented by so many pounds. Every wire or conductor, or non-conductor either, offers a certain resistance to the passage of a current of electricity, and the resistance which is offered by a column of pure mercury 106 centimetres long by one square millimetre cross-section at 0° C. has been accepted as the unit of resistance, and has been called the ohm. One mile of ordinary telegraph wire has about 13 ohms resistance. As we have a unit of resistance, we must have a unit of pressure to overcome that resistance, and it is called the volt. One volt will overcome a resistance of one ohm. With water we would say there was a pressure of so many pounds, and with electricity it is a pressure of so many volts; in either case it is a pressure to overcome a resistance. The ampere is the unit of volume or quantity: with water it would be the gallon, but we cannot measure electricity as we would water, though we can measure the effect that a given current will produce in depositing a given metal from its salt held in solution, and the deposition is directly proportional to the current.

The quantity of electricity that will pass in one second through a resistance of one ohm when the pressure is one volt has been taken as the unit of quantity, and is called the ampere. One ampere will deposit 17,253-1,000,000 of one grain of silver in one second. It is said that one volt

will overcome a resistance of one ohm, and it is a little difficult to understand or catch the exact meaning of it. I think a pipe carrying water will help us to understand. Suppose we have 1000 feet of pipe which we can lay perfectly level; now turn up both ends and fill the pipe with water; if either end is elevated, say one inch, the water will flow slowly from the other. An elevation of one inch would represent a pressure of about 1-24 of one pound; now increase the elevation of that end to two feet, which will give about one pound pressure, and we will find the water to flow about twenty-four times faster. If, on measuring the water flowing from the pipe, we found one gallon to flow in one second, we would say that one pound would overcome the resistance of the pipe, so that one gallon of water will be discharged in one second, and one volt will overcome the resistance of one ohm, so that one ampere will be discharged or flow in one second, which is one way of writing "Ohm's law."

If we increase the voltage while the resistance is kept constant, we will increase the number of amperes, or, if the resistance is increased with a constant voltage, the number of amperes will be decreased, and the increase or decrease will be in direct proportion. Divide the volts by the ohms,—that is, the pressure by the resistance,—and the quotient will be the amperes.

By the "difference of potential" is meant the difference of pressure or level, and the earth is taken as zero potential in the same way that the ocean is the zero for water level, the current flows from the higher to the lower potential; we say there is a difference in potential of so many volts.

I have not given as much attention to the galvanic battery as I have to some other parts of the subject; however, I may be able to give you some ideas that may help you to explain some things which you do not now quite understand.

I believe there are two theories about the generation of

electricity with the battery. One is that it is due to chemical action, and the other is that it is simply the contact of different metals or substances, and that it is the contact which produces the chemical action. The plates of a battery are supposed to be of different potentials, and, as the current falls from one to the other through the external circuit, the battery fluid serves the purpose of a pump, as it were, to raise it from the lower to the higher potential, so that it can again fall, and thus keep up a continuous circulation.

How much power can be gotten out of a battery, and how is the best way to arrange the cells, are questions frequently asked. The power of one horse is supposed to be able to lift thirty-three thousand pounds one foot in one minute, or five hundred and fifty pounds in one second. The electrical equivalent of the horse-power is seven hundred and forty-six watts. A watt is one volt multiplied by one ampere,—a volt ampere, as it is called,—and any combination of volts and amperes which when multiplied will give seven hundred and forty-six will represent one horse-power.

For instance, the horse-power may be one ampere and seven hundred and forty-six volts, or it may be one volt and seven hundred and forty-six amperes, and one volt and one ampere will be 1-746 of one horse-power.

Ohm's law is one of the most important of electrical laws, and is the key to the distribution and use of electricity. The law is, "The strength of a current in a wire or conductor is in direct proportion to the difference of potential between its ends, and inversely proportional to its resistance," and the units are so chosen that one volt will overcome the resistance of one ohm, so that one ampere will flow in one second. You may divide or multiply and split your current and conductor as you please, but the law will hold good.

Let us now consider the power of a battery-cell. Take a simple plunge-battery having two carbon plates and one

zinc, it will give about two volts and, we will say, ten amperes on short circuit,—that is, with no external resistance. Multiply two by ten and we have twenty watts; divide 746 by 20, and we have 1-373 of one horse power. But before we can use that power, we have to introduce a a transformer, say a motor or mallet, which will have some resistance, say one ohm.

The cell that will give ten amperes with two volts must have an internal resistance of 1-5 ohm; for the volts divided by the amperes will give the resistance. If we add the external and internal resistance, we get 1 1-5 ohm, divide the two volts by that, and we have 1 2-3 amperes, which is multiplied by the two volts, giving 3 1-3 watts, which is a very small part of a horse-power, being only 1-223.

We will now take six cells of the same kind and arrange them in series,—that is, with the carbon of one cell joined to the zinc of the next, &c. The external resistance is the same, but the internal is six times as great, or 1 1-5 ohms; add the external and internal resistance (= 2 1-5 ohms), and divide the volts, which would be 12, by it, and we have 5 5-11 amperes of current; multiply 12 volts by 5 5-11 amperes, and we get 65 5-11 watts; divide 746 by that, and we get a little less than 1-11 horse-power.

In connecting the cells in series you increase the voltage, but the amperes remain the same; while with the cells in parallel,—that is, all the carbons connected to one pole and the zincs to the other,—you increase the amperes by decreasing the internal resistance, but the voltage is the same as for one cell. Though the watts of the battery would be the same on short circuits in either case, the power through the resistance of one ohm with the cells in parallel would be but little better than for the single cell.

In regard to the arrangement of the cells to give the best results: it is said, to so arrange them that the internal and external resistance shall be the same will enable you to get the greater amount of work from the battery, and

therefore that should be the best and most economical arrangement. The idea is that, as the resistances are equal, there would be an equal amount of heat used in either circuit, or fifty per cent. of the total energy, and that with a perfect transformer of power you could never realize more than half the power developed by the battery. If you want to do the greatest amount of work in the shortest time, I believe that arrangement of cells will do it, but I think it is not the most economical arrangement.

In every case where electrical energy is converted into mechanical there is generated what is called a counter-electromotive force. If this counter-electromotive force equals the electromotive force of the battery, there would be no current flowing; consequently there would be no heating, and no work would be done. Electromotive force means the pressure of the current, or the number of volts given by the battery, and is generally written an E. M. F. of so many volts. The heating of the circuit is in proportion to the square of the current. The counter-electromotive force acts as a resistance, inasmuch as it reduces the current, and it should be as great as possible, to allow enough current to flow to do the work. Make the internal resistance of the battery as small as possible, —that is to say, use large carbon and zinc surfaces. The heat in the cells is wasted; you can only use the current in the external circuit.

In the calculation of the battery power, it is the electrical and not the mechanical power you get; there is always a loss in the conversion of energy.

In converting the heat energy of coal into mechanical, in the best and largest engines we cannot recover more than twenty per cent., while the locomotive engine, I believe, uses about eight per cent. With a good motor about ninety per cent. of the electrical may be converted into mechanical energy.

In regard to the storage battery and its care I feel that I know little, but as there may be some here who know less, I will try to define it.

Take two plates of lead and place them in dilute sulphuric acid (ten per cent. solution), and pass a current from two or more cells through them for a short time; upon disconnecting the cells and connecting the lead-plates you will get a current in the opposite direction, which will only last for a short time, though it may be of large volume; if the plates are charged and discharged a great many times in opposite directions, which is called forming the plates, they get a spongy surface upon them, when they are capable of receiving a large amount of electricity and returning a large portion of it. (Planta.) The forming process took several weeks, and was very tedious. Now the plates are generally coated or filled with oxide of lead in some manner, so that once charging forms the plates.

The storage-cell gives about 2.25 volts when freshly charged, which soon falls to 2, and is held at that for the greater part of the discharge. You cannot recover all of the electricity which is put into the cell in charging, but you can recover in a useful form a current which would be too small to use either with a lamp, cautery or motor. The storage-cell may be charged with a battery of gravity-cells which would give a very small current. But it would take many hours' charging to get one hour's work, and the rate of discharge will depend upon the resistance of the circuit.

Before considering the use of the electric-light current in our offices, I think it would be well to understand a little about the generators of the current or the dynamos.

Professor S. P. Thompson's definition of a dynamo-electric machine is, "A machine for converting energy in the form of mechanical power into energy in the form of electric currents, or *vice versa*, by the operation of setting conductors to rotate in a magnetic field, or by varying a magnetic field in the presence of conductors." The generators may be divided into two classes,—that is, those giving a continuous current, or a current flowing in one

direction; and those giving an alternating current,— that is, the current that flows first in one direction and then in the other, the alternations being very rapid.

The alternating current is not adapted to run the mallet, neither are there motors for that circuit very well adapted for our use; therefore I will not consider that current or its generators further.

The continuous current generators may be again roughly divided into those giving currents of high and those of low potential or voltage, though this is a comparative division. The dynamo to give a high potential current has many turns of rather fine wire on its armature, and is intended to give a current of small volume and great pressure, while the low potential dynamo gives a large current at low pressure, and has few turns of large wire or copper bars on its armature. One generator may give 10 amperes at 1000 volts, or 10,000 watts, and another would give 100 amperes at 100 volts, which also would be 10,000 watts, requiring the same power to drive them, and giving out the same power. The dynamo giving 100 volts would be called a low potential machine, and you can handel the wires without danger and with but little care, while a shock from the 1000-volt machine would probably prove fatal; the wires would be dangerous things to fool with, and they must be handled with great care.

The question is naturally asked, Why is one machine, or the current from one machine, dangerous, and the other harmless, when they both represent the same power? The answer comes from Ohm's law in this way. The resistance of the body from hand to hand with a dry skin is something like 3000 ohms, with the skin wet and making good contact, it will be in the neighbourhood of 1500 ohms. If we have 100 volts with a resistance of 3000 ohms, we would only get one-thirtieth of an ampere through the body, while with 1000 volts there would be ten times as much, or one-third of an ampere. It is the amperes which do the work, and the volts are only necessary to overcome the resistance of the circuit, so that the required number of amperes can flow. You can take a spark

from a Holtz machine which may be 1,000,000 volts without danger, because the current is infinitesimal.

The dynamo does not generate electricity, but it does generate a difference of potential; the amount of electricity flowing will depend entirely upon the resistance of the circuit, if the difference of potential is kept constant.

The arc light is generally placed on a circuit of high potential, while the incandescent is used with a low potential. The arc-light current, or the current of high potential, should *never* be introduced into the dentist's office for the purpose of using it to run the engine or mallet, or for any other purpose where the conductors have to be handled or brought in contact with either the patient or operator. The current could be handled and used all right if it were possible to be certain that the insulation of the wires would never fail, but, as that is an impossibility, no one has a right to expose himself, and particularly his patient, to a possible injury.

The incandescent current of 110 volts is higher than we want but it is impossible to hurt your patients with it without making a special effort, and even then it would be very difficult to do more than burn them. In using the incandescent current to run the engine an electric motor is used, which is so constructed that the full current can pass through without any external resistance being introduced, when the motor will run at its maximum speed; it will also generate a counter E.M.F. nearly equal to the E.M.F. of the dynamo.

To regulate the speed, there is used what is called a resistance-box, in which is wound a number of coils of German silver wire, and by pressing a lever with the foot more or less of the wire is thrown into the circuit, and in that way regulating the amount of current passing through the motor, and consequently the speed. It is theoretically possible to get a better method of regulating the speed of the engine, but whether it is practical, I have not yet determined.

If a motor wound for use with a battery were put in an incandescent circuit without any external resistance there would be so much current pass through, on account of its low resistance, that it would be burned out; and if resistance were added until only the number of amperes for which the motor

was wound could pass, there would be a great many watts wasted; and if the watts were reduced to the watts of the battery, the motor would probably not go at all. The motor has to be wound for the number of volts of the circuit on which it is to be used.

In using the incandescent circuit for running the mallet there has to be a very decided change in the potential,—that is, it must be reduced.

When there is a potential difference of about 30 volts, it is possible to produce an electric arc, and when the arc is formed the current is not broken As the action of the mallet depends upon the interruption or breaking of the current, the mallet would not work where there was a potential difference of 30 volts, because an arc would be formed at the interrupter.

I believe the mallet will work best with from 4 to 6 volts, or say three cells, so that the volts ought to be reduced to about that number. Adding resistance will reduce the current, but not the volts; therefore some other means has to be found.

In the apparatus gotten out by S. S. White Dental Manufacturing Company, resistance is introduced in the form of three lamps, so as to reduce the current to about two amperes; the current is then divided, part passing through the mallet, and the rest through a variable resistance which is less than the resistance of the mallet, so that most of the current passes through the variable resistance. The mallet works nicely, the arrangement is simple, and there is very little to get out of order. The current used represents about one-third of a horse-power, a small part only of which is used in the mallet. When the current is measured by meter and charged for accordingly; one-third of a horse-power costs less than three cents an hour. A motor of sufficient power to drive the engine should not cost as much per hour.

The electric motor is the reverse of the dynamo, and depends for its power upon magnetic attraction and repulsion, or upon the attraction and repulsion of a magnet for a conductor carrying an electric current, or both.

The amount of magnetism induced in an iron bar will depend upon the number of amperes passing round it, and is

independent of the volts. With a given bar of iron the magnetism will be the same if 100 amperes is passed once, or 1 ampere 100 times around it.

Any one who wishes to use the incandescent current in connection with dentistry should always remember Ohm's law, should give study enough to the subject to understand the principle upon which the appliance they use is founded, and understand its construction. The use of electricity in dentistry is in its infancy, and there is room for improvement in the existing appliances and for new ones.

I think there are few who, having used the incandescent current and understanding its use, would be willing to give it up.—*The International Dental Journal.*

Communications.

MISSOURI STATE DENTAL ASSOCIATION.

The Executive Committee of the Missouri State Denta Association announce that its twenty-sixth annual meeting will will be held at Pertle Springs, Warrensburg, Johnson County, Missouri, commencing Tuesday, July 8th, 1890. Nothing has been left undone, that was in the power of the committee, to make the meeting both attractive and instructive; the clinics will constitute a special feature of the programme.

To the older members of the Association, many of whom have not been in attendance of late years, we would say this meeting is intended to serve as a reunion, and you are especially urged to be present.

To those of the profession in the State who are not members of the Association we extend a cordial invitation to attend and unite with us in the good work. Every reputable dentist in the State owes it to himself, his patrons and his profession to attend and aid in building up his State Association. None are compelled to apply for membership in order to receive its benefits, so make your arrangements to be in at-

tendance whether you join the Association or not. To our brother dentists in other States we would simply say: You need no assurance of a welcome from Missouri, her arms are always open to you, and to as many of you as may honor us with your presence, we will endeavor to make the visit both pleasant and profitable. Reduced Hotel rates have been assured and those desiring rooms reserved in advance will be accommodated by addressing Mr. J. H. Christopher, Pertle Springs, Warrensburg, Mo.

OFFICERS FOR 1889-90.

President, Henry Fisher, St. Louis; 1st Vice-President, J. D. Patterson, Kansas City; 2nd Vice-President, J. P. Gray, Sedalia; Recording Secretary, John G. Harper, St. Louis; Corresponding Secretary, Wm. Conrad, St. Louis; Treasurer, James A. Price, Weston.

Executive Committee: J. F. McWilliams, W. L. Reed, W. H. Buckley.

Board of Censors: T. M. Nicholson, J. W. Whipple, J. F. McWilliams.

Committee on Ethics: W. H. Gaines, I. D. Pearce, C. V. Huff.

Publication Committee: H. S. Lowry, E. W. Stevens, W. E. Tucker.

Law: James A Price.

J. F. MCWILLIAMS,
W. L. REED,
W. H. BUCKLEY,
Ex. Com.

WM. CONRAD, *Cor. Sec'y.*

MEETING OF THE AMERICAN DENTAL ASSOCIATION.

The railroad arrangements are not all completed, but enough is known to assure at least the usual reduction of one and a third fare, on certificate plan, by all the different passenger associations.

Arrangements are being made for a special train from Chicago, which will leave here Sunday afternoon, and reach Excelsior Springs Monday morning. This will give the entire day, Monday, for the different sections to complete their reports.

All parties wishing to go in this special train will confer a favor by letting us know at once, so that we may know how many to arrange for. Just what rate will be secured for the round trip is not definitely settled, but we expect a low one.

A notice will be issued later giving exact time of starting and route selected.

Application has been made for reduced rates for the four associations, the American Dental Association, College Faculty Association, National Board of Dental Examiners and the Dental Protective Association. We are trying to get this rate good for ten days so that we need not adjourn before everything is finished.

Parties purchasing tickets should be sure to get receipt, showing that they have paid full fare going, this will enable them to get return ticket for one third regular fare.

J. N. CROUSE,
Chairman Ex. Com.
2231 Prairie Ave., Chicago.

EDITOR AMERICAN JOURNAL OF DENTAL SCIENCE,
BALTIMORE, MARYLAND.

Dear Sir:—At a meeting of the St. Louis Dental Society, held on Tuesday, May 20th, 1890, the following resolutions on the death of Dr. Homer Judd were adopted:

Whereas, The members of the St. Louis Dental Society have learned with great sorrow that death has removed from us our loved and honored associate, Dr. Homer Judd; and

Whereas, By reason of his great natural abilities, ripe scholarship, zeal, industry and integrity, he was recognized by the dental profession as one of its most influential members; a man who devoted his life to the honor and advancement of his profession; and

Whereas, During a long professional life, his relations with this Society have been such that it is our pleasure and duty to record our high appreciation of him; therefore

Resolved, That by the death of Dr. Homer Judd, the dental profession has been deprived of one of its most able and useful members, one whose influence for good will live forever.

Resolved, That we extend to his family our sincere sympathy in their great bereavement.

Resolved, That a copy of these resolutions be sent to the family of the deceased, and to the dental journals for publication.

W. H. EAMES,
HENRY FISHER,
A. J. PROSSER,
Committee.

MRS. E. E. CHASE, *Cor. Sec'y.*

Editorial, Etc.

THE DENTAL PROTECTIVE ASSOCIATION.

At meeting of the Michigan Dental Association, the principal points in Dr. Crouse's remarks were: First, that by combining in some such an organization as the Dental Protective Association we band the strength of ten thousand men into one—all defence, necessary can be made with but little more expense than would be required for an individual. The preparation of one case will answer for all; all evidence can be collected better by an association than in any other way.

Second, that it is very important that all get into the Association at this time for the reason that an appealed suit to the Supreme Court before the formation of the Association will probably be decided in favor of the Crown Company, owing to deficiency in evidence and imperfect presentation. If the Crown Company win this suit, they will send notices

all over the United States, thereby demoralizing the profession and causing many to pay them money which should be in the Protective Association and thus avoid that calamity.

The Protective Association will be ready with new evidence and a new record, and can take care of its members against any claims of the Crown Company. If you are not in the Association, the Association will not take care of you when the time comes. If each man in the profession will pay $10 and assume a responsibility of ten more, without any farther assessments, we will have an organization that is sure to break up all this abuse and save the dental profession an annual outlay of on an average of $100 each to unjust claimants.

Remember, it will cost more than $10 later to join and will certainly cost more than that if you do not protect yourselves.

Resolved, That the Michigan Dental Association heartily approves the aim and plan of the Dental Protective Association and that it is further

Resolved, That it is the duty of every member of the dental profession in this State to join the Dental Protective Association.

It is also resolved that Dr Crouse be requested to furnish the dental journals with an abstract of his remarks for publication.

W. H. DORRANCE,
W. D. SAUNDERS,
—— DOUGLASS,
Committee.

WM. CLELAND, *Sec'y*,
Mich. Dental Ass'n.

The next meeting of the National Association of Dental Examiners will be held in Excelsior Spring, Mo., on Monday evening, August 4th, at eight o'clock, and at other times during the week, between the sessions of the American Dental Association. It is important to have every State Board represented.

FRED. A. LEVY, D. D. S., *Sec'y*.

INVITATION TO THE TENTH INTERNATIONAL MEDICAL CONGRESS.

[All communications must be directed to the General Secretary, Berlin NW., Karlstrasse 19.]

In accordance with the decision of the Ninth Congress at Washington, the Tenth International Medical Congress will be held at Berlin from the 4th to the 9th of August, 1890.

By the delegates of the German Medical Faculties and the chief Medical Societies of the German Empire, the undersigned have been appointed members of the General Committee of Organization. A Special Committee of Organization has also been appointed for each of the different sections, to arrange the scientific problems to be discussed at the meetings of the respective sections. An International Medical and Scientific Exhibition will also be held by the Congress.

We have the honor to inform you of the above decision, and at the same time cordially invite your attendance at the Congress. We should esteem it a favor if you would kindly extend this invitation to your friends in Medical Circles, as way may offer.

We beg to accompany our invitation by a copy of the Statutes and Programme, as also by the List of the intended sections and their Special Committees of Organization.

SECTION XVI.—There will be five general subjects for discussion:

1. Bromide of Ethyl Narcosis.
2. Pyorrhœa Alveolaris.
3. Micro Organisms in Caries.
4. Crown and Bridge Work.
5. Irregularities of Teeth.

Of these one has been assigned to Germany, one to England, one to France and two to America.

Dr. W. C. Barrett, of Buffalo, N. Y., has been selected by the General Committee to present the subject of Crown and Bridge Work. and E. S. Talbot that of Irregularities of Teeth. These five subjects, with the clinics and demonstrations by men appointed by the General Committee for that duty, will make up the official programme of the Section.

The other papers read will be selected from the voluntary contributions, and will be as many as time and the General Committee will permit.

The American officers of the Section are as follows: W. C. Barrett, M. D., D. D. S., Buffalo, N. Y.; J. Taft, M. D., D. D. S., Cincinnati, Ohio; C. S. Talbot, M. D., D. D. S., Chicago, Ill.; H. J. McKellops, D. D. S., St. Louis, Mo.

R. R. Andrews, D. D. S., of Cambridge, Mass., has been by the Board appointed Honorary Secretary.

A large number of American dentists has signified their intention to be present at the Congress.

DR. RUDOLF VIRCHOW,
President.

DR. VON BERGMANN,
" LEYDEN,
" WALDEYER,
Vice-Presidents.

Dr. LASSAR,
Secretary General.

Monthly Summary.

MOUTH-BREATHING AND THE TEETH.—Dr. Scanes Spicer read a paper at the last meeting of the Odontological Society of London, upon "Nasal Obstruction and Mouth-Breathing as Factors in the Etiology of Disorders of the Teeth." In the course of his remarks he said he had been struck with the frequency with which carious teeth were associated with obstruction of the pharynx and enlarged tonsils; so much so that he made it a routine practice to examine the teeth in all cases of nasal obstruction, and he believed that there existed a relation between them; and he further is of opinion that there is a generic relation between some cases of vaulted arch, narrow jaws, and irregular teeth, and nasal obstruction. Normally we should breathe through the nose, so as to warm and filter the air respired. All animals, savage races, and young infants do so; but a large number of adults of civilized nations breathe through the mouth, because they have some obstruction of the nasal passages—erectile tumors, permanent catarrhal affections, polypi, post-nasal adenoid growths, etc. Mouth-breathing, he said, as a predisposing cause of caries of the teeth, came into action in various ways. The teeth were exposed to a current of air of a much lower temperature than that of the body, which would tend to cause inflammation of the periosteum and pulp of a tooth; the cold dry air produced congestion of the mucous membrane, with a secretion of stringy acid mucus; and the rapid evaporation of water which takes place when the mouth is constantly open

inspissated this mucus, which so formed a fertile soil for the development of micro-organisms. Again, when sleeping with the mouth open, the tongue falls back and the parotid secretion finds its way directly through the pharynx instead of bathing and washing the teeth. With reference to the so-called V-shaped maxilla, Dr. Spicer thought that many cases might be traced to mouth-breathing, the muscles of the cheek pressing unduly upon the soft alveoli when the mouth is open.—*Lancet*, Jan. 8, 1890.

A CASE IN PRACTICE.—*By Chas. Richardson, Fayetteville, Ark.*—Mrs. W., brought her son, aged 16, to me for examination for diseased teeth, having been referred to me by her physician. The young man was of robust health, but the left side of his face was noticably enlarged and the chin consequently thrown much to the right of the median line. I found that the inferior maxilla on the left side was considerably enlarged, externally, beginning just below the sigmoid notch and extending to a point about midway between the angle and mental process, the angle being about ½ of an inch lower and much more prominent on the left side than on the right. The soft tissues appeared as if swollen to eye and touch; but there was no inflammation and inquiry elicited the fact that there never had been a particle of soreness or uneasiness of any kind although the enlargement had been gradually increasing for a number of years. Both mother and son are highly intelligent and appreciated the importance of correct replies. As the physician thought the seat of trouble might be in the teeth, I made a careful examination with the following results: Caries in grinding surface of first and second, in molars both sides, and in median surface of left superior lateral. The teeth occlude properly except the superior centrals which close inside the lowers. They were badly decayed and were curved inwardly, which fact probably accounts for the faulty occlusion. The teeth were, with the exception of the carious ones, healthy and clean and no soreness or unpleasant effects were produced by tapping. The enlargement, as far as could be judged, had no connection with the teeth. The faulty teeth were filled except the superior centrals which were cut off and crowns fitted, which restored the articulation and, to some extent, the expression of the face. I directed the patient to await results, believing it best not to irritate the enlargement by treatment.

I would be glad to hear from others of the profession on this point, and will cheerfully answer any questions I am able in regard to it.—*Western Dental Journal.*

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ARTICLE I.

THE ODONTOLOGICAL SOCIETY OF GREAT BRITAIN.

The usual monthly meeting of the above Society was held on the 5th ult., at 40, Leicester Square.

The President, Mr. Felix Weiss, L. D. S. Eng., occupied the chair, and there was a very full attendance of members.

The minutes having been read and confirmed, Messrs. J. O. Butcher, Jas. F. Colyer, Jno. Greenfield, Chas. F. Rylot, and R. Wynn Rouw were balloted for, and duly elected members of the Society.

The Librarian (Mr. Ashley Gibbings) announced the receipt of various books and publications; among them being an Italian work, the English title of which was "The Pathology, Therapeutics, and Hygiene of the Cavities of the Mouth," the Year Book of the Scientific Societies, and a new Journal from Turin.

The Curator (Mr. Storer Bennett) had no report to make.

Mr. T. G. Read made a communication on "A method

of making an all-gold crown, illustrating a convenient way of making and using a model." He said that a model was most useful when crowning bicuspids and molars, and in some cases incisors and canines. The metal band of the crown is roughly adapted to the stump, and feather-edged previous to fitting in the mouth, the portion passing under the gum is the same relative distance beneath it around the stump, and a very perfect occluding surface is obtained. When crowning a stump, the rubber dam should, if possible, be first adjusted, and the pulp canals filled. The broken-down crown should then be reduced in height to allow for restoration of the occluding surface, the stump being left standing as high as possible above the gum Should it be necessary to cut away much tooth tissue, a long file cut fissure bur with a chisel point would be found useful for that purpose; drill two holes with the point for the labial to the lingual surface, one at the mesial, the other at the distal part of the crown. The tooth substance between these holes having been cut away, one blade of a pair of excising forceps is placed in the labial, and the other in the lingual opening, and the handles pressed together when the crown comes away. Small pieces of upstanding tooth substance close against another tooth may be readily removed with a wheel bur such as Dr. Meriam's, these projections can be cut from the inside without wounding the gum, and the unpleasantness of running a corundum wheel is avoided. The sides of the stump as far as the band is to extend should be made quite parallel, so that the crown may fit the stump quite closely and tightly. Previous to to paring the stump, cocaine in crystals should be rubbed on the gums with the finger, then the enamel and overhanging or projecting tissue may be stripped off with suitable enamel chisels. The sides of the stump having been pared quite parallel, should be finished smooth by carefully passing a safety point shouldered fine file cut fissure bur around it. Then take a strip of thin metal—such as telephone plate—trim and bend this to the stump, when

roughly fitted, press a small piece of softened composition to the band of stump, the patient then closes the mouth, and bites into the composition. As soon as it is hard, remove the impression of little band from the mouth. Cast a lower and upper model from this with the little band *in situ*, over this band make the metal band of the crown in coin gold, size 5, to fit it and correspond to the gum edge; the join should be at the lingual surface. Having fitted the band to the model, soften the end of a stick of composition and press the band on with the edge to go under the gum uppermost, this is feather-edged with a fine round file. Coin gold of the same substance of the band should be used for the cusps which should be struck up in White's die plate. Try the cusps to the occluding model and see if the bite will ride. Mark where it will, place the cusps on the male die of soft metal used to strike them up and with blunt punches knock down those places marked. The articulating surface is thus made perfect. Fill up some solder and mix it with a little Parr's flux, fill the interior of the cusps rather full and flow the solder over a Bunsen flame. The band should then be fine, fitted in the patient's mouth; when this has been done, solder it edge to edge over a Bunsen flame using binding wire as a clamp. Contour the band with contouring pliers. If the canals have not been filled, twist a piece of binding wire with a bead or two upon it round the contoured band, place this on the stump and use it to hold the rubber dam. Soften the end of a stick of composition and press the band upon it, with the occluding edge uppermost, with a fine flat file. Cut the surface flat, remove the band from the composition, and try it and the cusps in the mouth, removing and replacing it upon the stick to cut away until the cusps are let in and the occlusion is perfect. Place the cusps on a soldering gridiron, borax the edge of the band, and adjust it in position on the cusps, so that when the shoulder which is on the cusps is cut away, the buccal and anterior surfaces will be perfect. Hold the work over a bunsen

flame, and the solder in the cusps will melt and unite with the band. When soldered, if the lingual and posterior surfaces are not perfect, build them up with coin gold, scraps, and solder filings; run the solder with a blow-pipe. Boil in acid, trim with a fine corundum wheel, and polish, holding the crown on a stick of composition. Horizontally groove the pulp chamber, dry it out and fill it and the anterior of the crown with oxy-phosphates of a creamy consistency, press the crown on the stump with a notched tooth-brush handle, strike the tooth-brush handle once or twice with a lead mallet to expel any surplus cement. When the setting is hard, trim away any excess of cement with a broken-back chisel. The mallet should be only used in the final stage, for, if properly made, the band may be pressed on the stump with the finger.

Mr. Walter H. Coffin remarked that in hearing a communication read with the rapidity that the one they had just listened to had been given to the meeting, it was quite possible to overlook some points. The only new point which he had been able to see was the fitting a base metal immediately, and adapting around that the permanent gold crown which would of course be too large, and then have to be closed up in the mouth and soldered. It seemed to Mr. Coffin that the filling of the permanent gold crown on the stump could be accomplished in the first instance as easily as in any other metal; he imagined, however, that Mr. Read found it more convenient to handle some other metal in the initial stage.

Mr. Read said the telephone plate band was not fitted to a nicety but only roughly; it could be done in about three minutes. Then the band was cast, or an impression taken, and an assistant could get the gum edge right. One advantage was that an assistant could do the work which would otherwise have to be done by the principal himself. Then the point was to get the gum edge right, in the specimen he had passed round, it was very shallow on one edge and deep on the other, it would be very difficult to make it in any other way.

Mr. H. Baldwin narrated a case of chronic enlargement of the upper jawbone which had been under his observation for about eight years. The patient was an unmarried woman aged 39, and on first coming to him the enlargement was very marked, chiefly on the left under side of the molar region. For about six years after he first saw her it underwent very little change, but in the seventh year the enlargement grew considerably and the mucous membrane became pencilled over with blue veins, suggesting that the circulation was getting more free, indicating the necessity for operation. The growth was hard and bony to the touch. He had called it a case of hyperostosis, for want of a better definition, as it had many of the characteristics of that disease. The case was operated upon in the latter part of last year by Mr. Pearce Gould of Middlesex Hospital, the gum was deflected away from the growth, and the bone removed with bone-cutting forceps. It was found very easy to remove, and not of the ivory description which he had anticipated. The peculiarity of the case was, that wherever the partial plate, which the patient was wearing, touched the mouth, there the growth was much less marked; for several years everywhere where the plate touched was perfectly healthy, it was only in places where there was no contact with the plate that the growth developed. The plate seemed to have operated in preventing the occurrence of the growth and in no way to have irritated it. The model, which he showed, had been taken since the operation, and as that was performed only in December last, sufficient time had not elapsed to say whether a complete cure had been effected, but at present there were no signs of recurrence of the growth. One peculiarity of the patient was that the nasal processes of the maxillary bones were more prominent than is normal, and the question was whether this was a first instalment of a general enlargement or whether the nasal prominence were merely accidental, which would be cured by operation. There were sections of the growth under the micro-

scope; it seemed to consist of a cancellous bony structure and the spaces were lined with fibrous membrane. Portions of the growth contained small cysts visible to the naked eye, about the size of a very small pea, lined with glistening membrane.

Mr. Howard Mummery then read a paper entitled—

NOTES ON THE PREPARATION OF MICROSCOPICAL SECTIONS OF TEETH AND BONE.

The paper was accompanied by an exhibit of photo-micrographs thrown upon a screen by a lantern. Having referred in some detail to the disadvantages of the "decalcification method," Mr. Mummery said that his interest in the process he was about to describe was first awakened by a remark of Mr. C. S. Tomes, who told him some two years ago that Professor Moseley, of Oxford, had mentioned a plan of hardening sections of teeth with gradually increasing strengths of alcohol. No details, however, of the process were given by him. But these particulars were supplied by Dr. L. A. Weil, in a German Microscopical Journal, and were reproduced as an extract in the English Royal Microscopical Society's Journal, December, 1888, p. 1042.

Mr. Mummery prepared some sections according to those directions, and was so pleased with the results that he had since cut nearly 200 specimens in the same way. By this method no decalcification is required, and the cells and connective tissue of the pulp, and also of the peridental membrane, are retained in their natural relations to the hard tissue.

The extract in the Microscopical Society's Journal stated that:—"Dr. L. A. Weil takes only fresh or nearly fresh teeth, and in order to allow reagents and stains to penetrate into the pulp cavity, divides the tooth immediately after extraction with a sharp fret saw below the neck into two or three pieces, allowing water to trickle over it the while." Mr. Mummery said that to procure

longitudinal sections it was advisable to cut them a little to one side of the pulp cavity, just opening this enough to enable stains to penetrate. Continuing the quotation, "The pieces are then laid in concentrated sublimate solution to fix the soft parts. The sections are then washed in running water for about an hour and placed in 30 per cent. spirit for twelve hours, and for a corresponding period in 50 per cent. and in 70 per cent. spirit. To remove the black sublimate precipitate the teeth are then laid for twelve hours in 90 per cent. spirit, to which 1.5 to 2.0 per cent. of tincture of iodine has been added. The iodine is removed by immersion in absolute alcohol until the teeth become white. They are now ready for staining, and the stain which Dr. Weil recommends is borax carmine (alcoholic or aqueous solutions). After being washed for fifteen to thirty minutes in running water, they are left in the stain for two or three days; they are then transferred to acidulated 70 per cent. spirit, in which they remain, the watery-stained ones at least twelve, the alcoholic-stained ones twenty-four to thirty-six hours. They are then immersed for 15 minutes in 90 per cent. spirit, and then for half an hour in absolute alcohol, after which they are transferred to some etherial oil for twelve hours or more. The etherial oil is quickly washed off with pure zylot, and they are placed for twenty-four hours in pure chloroform; after this they are passed into a solution of balsam in chloroform. This balsam is prepared by drying in a water bath, heated gradually up to 90 degrees C. for 8 hours or more, until when cold the balsam will crack like glass on being punctured. The sections are allowed to lie for twenty-four hours in a thin solution of this dried balsam in chloroform, and then as much balsam is added as the chloroform will take up. The sections covered with the balsam solution are then placed in a suitable receptacle over a water bath kept at 90 degrees C. and this cooking is kept up until the mass of balsam, with the teeth in, cracks like glass when cold. This requires two or three days. Thin pieces are

then cut from them with a sharp fret saw, and they are then ground down in the usual manner"—first on a corundum wheel, afterwards on stone. Mr. Mummery said that the advantage of the sublimate appeared to be due to its coagulating the albumen of the tissues—it certainly seemed to be very efficacious in preventing shrinkage. His most successful sections had been ground down on a Washita stone, using a piece of cork, or the finger, and plenty of water. The *debris* could be very conveniently washed off the completed sections with a fine spray of water, blown through an ether spray apparatus. The section could then be mounted in chloroform balsam.

The process as detailed no doubt appeared very tedious and complicated, and was almost enough to deter anyone, who had but little leisure, from undertaking it; but when a number of sections were being prepared in different stages the passing on from one solution to another did not occupy much time. Wolrab's gold bottles in a rack formed excellent receptions for the sections, a note being made on a label on the bottle of the stage they had reached. With this as with most other processes, there were of course a good many failures, some being caused by insufficient cooking, resulting in the pulp not being hardened enough, others by too prolonged cooking, which produced brittleness. The cutting down was certainly very tedious, and should be done on a slow-cutting stone. Again, without great care in grinding very thin sections, the pulp might break away at the last moment—only by practice could one learn to avoid this annoying accident. Borax carmine penetrated well and stained the nuclei very strongly, but did not give so much detail in the pulp as some other stains. Very good results might be obtained with aniline blue-black, which stained the nerve fibres as well as the nuclei and connective tissue. Mr. Mummery had not been very successful with hæmatoxylin, but had been told that Erlich's hæmatoxylin, which does not precipitate, would probably be the best stain to use in this process. The

teeth he had made use of had been chiefly young bicuspids, some with the apex of the root still incomplete. He had also made sections of older teeth for comparison, and of some carious teeth and abscesses. In these latter he thought the process might prove very useful, enabling one to study the early stages of abscess formation.

Mr. Mummery, having expressed his indebtedness to Mr. Theodore Harris for the great help he had given him in preparing the sections, devoted the remainder of the time to pointing out the characteristics of the very beautiful specimens photographed on the screen. No description of these specimens will convey any adequate idea of their appearance, but a reference to one or two will serve to demonstrate the importance of the process.

A transverse section of the pulp of bicuspid tooth exhibited the pulp with its relation to the walls of the pulp cavity undisturbed. The odontoblast layer was seen very distinctly differentiated from the rest of the pulp, lying in immediate contact with the semi-calcified portion of the dentine, the tissue, "on the border-land of calcification," that part of the matrix which had evidently undergone some change, being in advance of the line of complete calcification. The blood vessels were seen in transverse section, and also the slightly denser condition of the central part of the pulp, noticeable in many of the specimens.

The next slide from a similar pulp was interesting as showing in the large blood vessels in the centre what very delicate tissue could be retained in position by the hardened balsam during the process of grinding.

Another slide, taken from a tooth which was extracted before the apex of the root was completed, showed the odontoblast cells, which, together with their nuclei, had taken the stain deeply, not to be lying in close contact but to have distinct spaces between them. Mr. Mummery did not think this was due to shrinkage in preparation, as he had found it in all the open ended bicuspid teeth which he had examined; and other specimens prepared by this pro-

cess seemed to indicate that there is no appreciable shrinkage of the odontoblast cell. Mr. Hopewell Smith, in a paper published in the *Dental Record* for August, 1889, speaking of the dentine after the commencement of calcification said: "Between some of the cells of the membrana eboris there are wide visible spaces, filled with homogeneous substance and small round and angular cells." Mr. Mummery remarked that Mr. Tomes also appeared to be a little shaken in his views on this point, for whereas in the earlier editions of his "Dental Anatomy," he said (p. 159, second edition): "The odontoblasts are fitted closely together, and there is no room for any other tissue between them"; in the third edition (p. 69) he says: "There is not much room."

Deposits of secondary dentine in the pulp are well exhibited by this method of preparation. The specimen shown was taken from a molar tooth, to all appearance sound, which caused intense neuralgia, rendering it necessary to extract it. The pulp was densely packed with secondary deposits, encroaching in every direction upon the nerves and blood-vessels. This deposit exhibits some curious concentric and radiating masses. The next slide was from a similar pulp, showing some very large deposits.

Another showed a tooth extracted from an old person, in which the whole of the pulp appears to be converted into a semi-calcified material, apparently of cartilaginous consistency, with islands of calcified tubular dentine. Mr. Mummery had been struck with the fact pointed out by Mr. Salter in his "Dental Pathology"—that many young and apparently healthy pulps show numerous deposits of secondary dentine. Mr. Salter, in the work referred to (p. 139), says this change is to a great extent reparative, and the result of trivial causes, though Mr. Mummery believes it never occurs unless the tooth has been in some way the subject of injury or irritation.

The specimens in which it was seen were certainly untouched by caries; but they may have been subjected to

some form of irritation conveyed to the pulp from the great pressure caused by overcrowding.

Interglobular spaces in dentine are very well stained in the balsam process.

Caries in a fissure in the enamel.—This slide was prepared to show that the process, while keeping the relations of the carious portion to the calcified tissue, retains also in position tissue that has undergone a very considerable amount of disintegration.

A great number of slides were shown; and in conclusion Mr. Mummery expressed the hope that some of the points he had simply touched upon might suggest lines of investigation to those engaged in microscopical work.

The President said they were greatly indebted to Mr. Howard Mummery for his very lucid and able paper, and for the beautiful illustrations, and he invited comments upon the paper.

Mr. F. Newland-Pedley said he was able to confirm from his own experience the value of the process which Mr. Mummery had described, but like many other things, it was of some antiquity, having been known for the last fifteen years. Some five or six years ago one of his colleagues at Guy's wished to investigate the development of rider's bone, and it was necessary to show hard and soft structures at the same time: he (Mr. Newland-Pedley) cut sections by Mr. Mummery's method, and they were shown at the Pathological Society.

Mr. H. Baldwin wished to ask Mr. Mummery whether the transparent portion which intervened between the dark layers was not chiefly formed of the unstained portion of the odontoblast cell, and whether the dark layer did not consist of the nuclei only of the odontoblast. Also whether the so-called spaces were not unstained portions of the cells? Again, as to the small groups of cells which were found in the periosteum, and which were said by some to be epithelial pearls, whether there were not some stain which would show whether they were of an epithelial nature or not?

Mr. Arthur Underwood said if it would not be taking a liberty to relieve Mr. Mummery of the trouble, he would take upon himself to answer two of the questions. If the parts were stained with gold the whole cell becomes perfectly stained, and the interspaces are quite marked, and that without confusion of substances, still more the transparent layer that lies between the cells is marked out quite plainly, being in no kind of sense a part of the cell, there could be no kind of confusion, there was no doubt that an interval does exist. Mr. Underwood thought that they ought really to feel very much indebted to Mr. Mummery for his epoch-making paper in dental microscopy. Though Mr. Newland-Pedley seemed to have been so happy as to have hit upon the same process a long time ago, still it had remained for Mr. Mummery to make it public property. All dental microscopists would feel under a great debt of gratitude for having solved the difficult problem how to cut hard and soft tissues together leaving them undisturbed by the influences either of the knife or the fluids. Mr. Underwood knew from experience how ready critics were to assert that the appearances were due to decalcifying fluids. He thought a tablet should be raised to Mr. Mummery for having delivered them from these tiresome critics.

Mr. Charles S. Tomes wished, in endorsing Mr. Underwood's remarks, to emphasize the fact that Mr. Mummery had been the first to produce preparations which would go very far towards necessitating a revision of much that had been written on the question of the development of dentine. The points in question Mr. Mummery had hardly touched upon, because until he had thoroughly worked the subject out he very rightly did not wish to say anything he might have to recede from. Mr. Tomes would not have said anything about it had not Mr. Mummery confined himself very much to the exhibition of the process, and had not Mr. Newland-Pedley said that the process was not very new, thereby implying that it was not

worth while demonstrating what the process could do. This much he would assure Mr. Newland-Pedley that Mr. Mummery's demonstrations were entirely novel to him (Mr. Tomes); they showed things which he had never seen approached, and he felt sure they would give some results which would necessitate a great deal of re-writing.

Mr. George Cunningham desired to call attention to the fact that the photographs were all the work of Mr. Mummery himself, so that he was not only an able microscopist but also a photomicrographist who might vie with Mr. Andrew Pringle who had been described as *facile princeps*.

Mr. Charters White felt that he ought to add his testimony in favor of Mr. Mummery's very able paper. He (Mr. White) had been reading for the last thirty years on the subject of microscopy and photomicrography, and had made the subject a special study, but he was bound to say that he had never been so fortunate as to reach the process before. Decalcification of the bony tissues resulted in the destruction of the shape of the cells, and the presence of acid in the pulp made them very difficult to stain. Mr. White felt that Mr. Mummery had given the death knell to the decalcification of the tissues, and he would, for one, adopt the process new to him, because he felt it was capable of giving details which decalcification had never yet afforded. He would like to ask Mr. Mummery if the sections could be rubbed down in his process in the same manner which he (Mr. White) had always described for dry sections, because in that way it would be possible to get photographs much clearer and sharper.

Mr. William Hern wished to ask Mr. Mummery if he could explain how it was that after a process of prolonged and powerful heating, soft tissue, which was known to contain a large per centage of water, seemed to occupy the same space as before the process.

Mr. Charters White said, if he might be allowed to reply, he thought the use of the corrosive sublimate as a

fixing agent, and then afterwards the hardening in absolute alcohol prevented, any further change, for the soft tissue being saturated with Canada balsam could not possibly have its real histological elements altered.

Mr. Howard Mummery said, in reply to Mr. Newland-Pedley, that he was not aware that the process had been really well known before, although of course there had been hints of it, but he thought to Dr. Weil belonged the credit of bringing it out properly, and giving those minute details which were so necessary to practical working. With regard to Mr. Baldwin's questions, Mr. Arthur Underwood had so ably answered them that he did not think it was necessary for him to add anything. He (Mr. Mummery) quite agreed with Mr. Underwood that the spaces between the odontoblast layer and the fully calcified dentine are crossed by the tubes, and the spaces between the cells are not part of the cells. If Mr. Baldwin would look at the specimens under the microscope he would see that this was so. Mr. Mummery wished to thank Mr. Tomes for his very kind remarks. He quite agreed with Mr. White as to the evil effects of decalcification, and thought that the specimens might be cut down by his (Mr. White's) method, but at present he was only feeling his way, and had not adopted it; the difficulty would be to be able to see if the pulp were sufficiently rubbed down. With regard to Mr. Hern's remarks, the water in the tissue is gradually taken out by the spirit, the shrinkage is avoided by slightly increasing the alcohol, and the balsam takes the place of the spirit. The value of the corrosive sublimate is very great, as it fixes the specimen and prevents the shrinkage which often takes place.

The usual votes of thanks having been passed, the proceedings terminated with the announcements for next meeting.—*London Dental Record.*

ARTICLE II.

PROSTHETIC HYGIENE

BY PROF. J. HALL LEWIS, D.D.S., WASHINGTON, D. C.

[Read before the Washington City Dental Society, March 18th, 1890.

It seems about settled at the present day, among the medical profession, that this body of ours is, in health, but a conglomerate mass of minute active organisms, each living its own life and performing its allotted functions towards nourishing and sustaining the system as a whole; and that disease is but a riot or rebellion of one or more colonies of these organisms, who by their temporary refusal to perform their proper task, pervert, for the time being, the function of some part or organ sufficiently important to be felt by the entire system. Just as the strike of a large body of wage-earners, and their refusal to perform *their* appointed tasks, affects not only the factories in which they are employed, but also the community of which they are a part, and, indirectly, the nation to which they owe allegiance.

The microscope tells us that we live in the midst of myriads of micro-organisms—that the air we breathe, the water we drink, the food we consume, all contain, in immense numbers, microbic socialists and free-lances, ever ready to enter our systemic manufactory and there preach treason and sedition to the minute atoms which make up the bodily tissues, thus turning them from their allegiance to the central power of life and development, and by their inflammatory doctrines cause local strikes, organic dead-locks, and constitutional revolutions.

It is believed that at present only nine of the innumerable varieties of micro organisms around us have been conclusively proven to possess the property of directly caus-

ing disease; but it is expected that very soon the list of these will be materially enlarged, and physicians of all creeds are now combatting disorders from this stand-point. The homœopath riddles the deadly microbe with countless sugar-shot; the allopath crushes him with a ten-grain capsule; the hydropath drowns him; the faith-curist prays for him; and all unite in treating him as a common enemy.

Attention is not confined, however, to simply destroying the intruder, but also to preventing his ingress; and *preventive* medicine is daily receiving more and more attention from the scientist, who is already overwhelming us with warnings and suggestions regarding the barring-out of this omnipresent disease-producing marauder.

The air we breathe, he says, should be filtered through antiseptic gauze; the water we drink must be boiled, or else, as some prefer, liberally adulterated with the most potent "Dew of Old Kentucky." Before imbibing milk, it it should be punched with care. If we approach the lips of sweet sixteen with osculatory intent, a bug-killer must intervene; for upon the very pinnacle of Cupid's Brow may crouch a gigantic monster of full one ten-thousandth of an inch in length, ready to spring upon us, to our undoing. The old-fashioned feather duster is interdicted, and our office furniture should be cleansed by means of a cloth and a small boy, in order that the aforesaid cloth and boy may collect the micro-organisms, instead of ourselver.

To come down to solid facts, it is at present believed that bacteria abound; that some of these are producers, or carriers of disease and that they should be prevented *in every possible way* from gaining an entrance into our bodies Also, the production, or rather propagation and multiplycation of these microbes, is favored by a condition of immobility, of comparative warmth, and by the presence of a sustaining fluid. Again, that the disease-producers are dangerous, in proportion to their numbers, the system seeming to tolerate the presence of a comparative few, but being

unable to withstand the onslaught of a multitude of the same variety.

It is a fact, a sad fact, that the very great majority of artificial dentures worn at the present day are constructed of vulcanite, as the basal material. When this rubber is carefully and skillfuly vulcanized, the resulting product is porous in structure, containing numberless gas-cells, opening one into the other, thus forming multitudes of spaces, which may be likened to hollow beads strung upon and opening into a connecting tube. If the indurating process be ignorantly or hurriedly performed, then this ever-present condition of porosity may be very materially increased.

Again, as regards the *process* of vulcanization. It is sufficient for the scope of this paper to say, that it is a chemical reaction, brought about by the fact that the hydrogen of the caoutchouc, when under heat, has a greater affinity for the sulphur present than for the carbon, with which it was formerly united, and sulphurated hydrogen is thus formed, which *escapes* as a well-known malodorous gas.

It is thus seen, that the soft rubber, while heating, gives up sulphur and hydrogen, and gets *nothing* in return; it, therefore, contracts or lessens in bulk.

But, the artificial teeth, to which the rubber fastens itself through the medium of the pins, are, during the process of hardening, held immovably by the plaster investment; they cannot, therefore, follow the contracting rubber; hence, a *space* must exist between the porcelain and the vulcanite.

Again, if gum sections are used, there are five joints in a full denture, which are decidedly not fluid tight, and which are often protected posterially from discolonzation by cement, or plaster of paris, which afterwards dissolves, or washes out, leaving additional space between the porcelain and rubber.

The preparation for the mouth of such a set of artificial teeth, by the average dentist, consists in polishing the

lingual surface of the rubber more or less thoroughly, and of cleansing the palatal aspect more or less *poorly*. Thus, it is seen, we have a denture, the basal material of which is naturally porous, and in which a space exists between the porcelain and the rubber, which space is often enlarged by a veritable trench, back of each joint.

Some dentists instruct their patients to remove their dentures, at night; others advise their retention at all times; still, others give no instructions whatever; and very many patients do as they please, without regard to instructions.

Thus, days, months, years, go by. Sooner or later, the polish given the lingual aspect of the denture is worn away; with it, the effect of surface condensation disappears and the softer and naturally porus structure of the rubber is exposed. The vulcanite material itself, as well as the spaces heretofore shown to exist under the porcelain, soon become thoroughly saturated with the fluids of the mouth, which are loaded with decomposing organic matter. Now, I ask, could a more perfect bacterial culture apparatus be conceived by human ingenuity

Here, we have a constant and equitable temperature of about 98°; perfect rest and quiet; an ever-present fluid medium; food of sufficient quantity and variety to tickle the palate of the most fastidious microbe epicure; and, lastly, the germs and spores in the food materials, and in the air which we at times breathe through the mouth. Hence, every space, every vulcanite pore becomes the seat of a thriving bacterial community—the bacilli hob-nob with the spiro-chetæ; the micrococci with their cock-eyed brothers, the spirillæ; and all increase and multiply, after their kind, until the denture is but a seething mass of corruption, and, according to the germ theory of the disease, is in a fit state to introduce, possibly, fatal disorders into the wearer's system, at the very moment when that system is, perhaps, least able to withstand the onslaught.

Not only to the wearer, but also to those in his immediate vicinity, is this a source of possible danger, for every

word which the possessor of such a denture utters is charged with microcobic life, and, at the very moment that he kindly inquires after your good health, he may fire into your lungs a load of phthisical germs, as you take breath to return the compliment.

And now let us see what attention the advanced physician, or the antiseptic surgeon, gives to this subject. He examines the tongue, the fæces, the urine, of his fever-stricken, or diptheretic patient; he scans closely his food and drink; but, does he ever cast a single glance at, or give a moment's thought to, the artificial denture which stands at the side-entrance, so to speak, of the lungs, and which guards the very initial process of digestion?

Can it be doubted, that the chances of recovery of the invalid, suffering from lack of assimilative power, are lessened, when the food introduced into his stomach, and the remedies employed to combat his disease, are loaded with the contents of these multitudinous cess-pools? Or, what hope is there for the recovery of the patient, afflicted with some bowel disorder, if, with his nourishment, is poured into his digestive tract immense numbers of the very organisms positively said to produce his particular disease?

The physician, in short, pays no attention to the artificial teeth of his patients, leaving these substitutes to the care of the dentist, who is supposed to know all about them, and to give all needed advice as to their proper treatment.

So far, this subject has been considered solely from what might be called a microscopical stand-point; and it is undoubtedly true, that many members of our profession believe that the practical utility of microscopical investigation is overestimated, and that, in fact, about these little bugs there is a great deal of humbug. Let us, then, examine the question, from the view of these gentlemen; with the unaided senses of sight and smell.

A vulcanite denture is credited with causing, in many cases, excessive absorption of the underlying tissues,

though in any given case is ever present the possibility that the same would have occurred under a metallic base. Congestion of the neighboring mucous membrane, at times violent inflammation and ulceration, a persisently heated sensation in the parts, chronic tonsilitis, and excessive flow of saliva—all these, and many more troubles, have, time and again, been traced directly to the presence of *old* vulcanite dentures. Also very often is the wearer an object of discomfort, or even disgust, to the associates, who have a *keen* sense of smell; for, be it known, that we possess this sense in different degrees, and are "near-smelled" quite as often as near-sighted.

A porous material, as bulky as the average full denture, saturated with decomposing matter, even provided the wearer use all ordinary care to cleanse it, cannot but possess a disgusting odor, and be an object of discomfort to the surrounding tissues, and, certainly, an exciting cause of at least *local* disease, in favoring systemic conditions.

Now, whether the germ theory of spreading disease be over-estimated or not, if the other evils mentioned be a possible result of wearing unclean dentures (as is most assuredly the fact), do you think that we, as members of a scientific and progressive profession, do our full duty to our patients, in view of the slight notice we take of the artificial substitutes, after they are once inserted in the mouth? I am afraid that, as a rule, we do not give that thought and attention to this subject that its importance demands.

It would be considered almost criminally careless for the dentist, after thoroughly filling all cavities of decay in a patient's mouth, to dismiss the patient with the teeth heavily coated with calculus; yet the same dentist, after carefully removing all foreign matter from the remaining natural organs, polishing and purifying these, until, with the surrounding tissues, they are perfectly sweet and healthy—that same dentist may often, with lofty disdain, take in his immaculate fingers a five-year old rubber plate,

with its accompanying adornments of tartar, nicotine, decomposing food, and bacterial swarms, and snap it in the mouth, mentally thanking heaven that he is *not* a mechanical dentist, and has nothing to do with such horrid objects.

The very great majority of dentists, however, err in this direction, simply because of carelessness. They have never given the matter any amount of thought; allow the student, or office-boy, to vulcanize and prepare the case, and, after inserting it, with a few general directions, dismiss it entirely from their minds, when they dismiss the patient.

That very little study has been given to this subject is evidenced by the fact that, while countless numbers of papers have been written on "Root-filling," "Bridging"—in fact, every common operation of general dentistry and dental hygiene—I have failed, after a very diligent search, to find more than *one* writing on the subject under consideration, and that one simply sounded a note of warning, and made no attempt to combat the evils mentioned, or to prevent the propagation of the bacteria described as being present in an artificial denture.

It is to those dentists, then, who have given no thought to this phase of prosthetic dentistry that I offer the following suggestions, with the hope that thereby sufficient interest may be aroused to cause these ideas to be tried, improved upon, the results noted and given to the profession:

A "continuous gum" denture is by far the cleanest and purest of all forms of dental substitution; and the wearer can, by proper attention, keep such a denture absolutely free from decomposed food products and bacterial formations. It seems, however, that this material possesses certain peculiarities militating against its general use, besides the fact, that it is inadmissible in the great majority of partial dentures.

Next in desirability, from a hygienic stand-point, is the denture of gold, with the teeth fastened by means of vulcanite.

This method is applicable to partial as well as full dentures, is the strongest and least bulky of substitutes in general use, and seems more readily constructed by the dentist possessing average prosthetic skill than the continuous gum, and can be kept comparatively free from oral accumulations, though not to the extent possible in the case of the latter material. Pink rubber should connect the teeth to the gold plate; for, as it contracts less in vulcanizing than the other varieties, it, therefore, fits more snugly against the porcelain and gold.

If gum sections are used, the joints should be flat and solid, and without posterior protection, as pink rubber will not discolor them. Only the amount of rubber absolutely necessary should be present, and it should be covered by a wide rim of gold at the lingual aspect of the plate, extending up as far as, and as close as possible to, the pins of the teeth; thus reducing to a minimum the amount of material capable of absorbing the oral fluids and of harboring bacteria.

By all just and proper means should we endeavor to induce our patients to have their dentures constructed of either of the two materials described above; that is, of the so-called continuous gum, or of the gold and rubber combination. As, however, in spite of all talk against it, it is assuredly true that vulcanite is used in the very great majority of cases, it behooves us, as honorable servants of our patients, and as members of a scientific and progressive profession, to use this substance with due regard to their health and comfort, and in such a manner as to remove or counteract, as far as lies within us, its possible baneful effects, whether local or systemic.

As before stated, while the material, in its very nature, is porous, great care must be used, in vulcanizing, that the heat be not carried to "too high" a point, else, from over-rapid elimination of sulphurated hydrogen, increased porosity will unavoidably result. To this end, the vulcanizing apparatus should be closely watched by some one possessing more knowledge and discrimination than the office-boy; the thermometer tested from time to time, and the mercury-bath examined; for, at times, the packing above this bath disintegrates, the metal, from its volatility, escapes, and the thermometer, though

itself perfect, may thus register the degree of heat incorrectly.

The heat should not be continued *longer* than is requisite to properly indurate the rubber; for the *unnecessary* loss of hydrogen and sulphur results in greater contraction, and thus enlarges the unavoidable space between the porcelain and vulcanite. Pink rubber should be used in the more bulky portions of the dentures, and as generously as permissible, with a proper regard to strength, in order that the above-mentioned space may be reduced to a minimum.

All surfaces (the palatal, as well as the lingual, or buccal) of the vulcanite should receive as high a polish as the material will admit of, as this effects a surface condensation; thus more effectually preventing external deposits, and closing the pores to the entrance of the oral fluids and bacterial germs. But, inasmuch as this polish wears off, in the course of time, thus exposing the softer structure, it is "absolutely essential" that at certain stated intervals (say of six months) the denture should be returned to the dentist, to be thoroughly cleansed and re-polished by him. This, besides being a generally unthought-of source of revenue to the dentist, soon becomes a most desirable and highly appreciated process to the patient, because of the added comfort and cleanliness, the truth of which only needs a trial to demonstrate. The prosthetic dentist who fails to insist upon a semi-annual cleansing and polishing of the artificial teeth, is just as culpably careless of his patient's welfare as is the operative dentist who neglects to remove calculus and other deposits from the natural teeth of those under his charge.

But it has again and again been stated that the vulcanite is even at best an exceedingly porous material, and is, therefore, capable of receiving and retaining decomposing fluids "within its own substance," and, in spite of the most faithful "surface" cleansing given it by the wearer, or the dentists. In order to meet this hygienic difficulty, brought about by the structural peculiarities of the material under consideration, the artificial teeth should be nightly placed in an antiseptic or disinfectant fluid, there to remain until morning; which fluid should permeate the vulcanite structure, insinuate itself into the space between the base and porcelain, and into all other

interstices present; there to prevent or retard the decomposing process, and render harmless the ptomanic alkaloids of the bacterial formations. As this fluid is to be used freely and continuously by the patient, it must, of necessity, be free from poisonous qualities, easily prepared, and of slight cost.

Disinfectants, or germicides, act by destroying bacterial life, and are not to be considered in this connection, because of their poisonous attributes, and other readily observed reasons.

We must use, then, one or more of the many antiseptics. whose value depend upon the fact that they "retard" bacterial growth, and, consequently, lessen the production of ptomanic matter, which is dangerous in proportion to its quantity.

As a result of considerable experimentation and research, I have come to the conclusion that the very best fluid, all things considered, for this purpose, is the solution made from "Seiler's Antiseptic Tablets," consisting of sodium, the silico-fluoride, bicarbonate-borate and chloride, also eucalyptol, thymol, and oil of gaultheria. The small cost of this allows of its being used freely by plate-wearers, and it serves the purposes intended most excellently.

In use, a bottle is filled with clear water, and the tablets dropped in, at the rate of one tablet to four tablespoonfuls of water. The artificial denture is cleansed, placed in a suitable vessel, and covered with the antiseptic solution, which may first be further adulterated with an equal bulk of water. A gallon of this fluid will cost your patient less than fifty cents, is easily made, is perfectly harmless, and imparts to the denture a sweetness and freshness which is simply delightful, and which can be obtained by no amount of ordinary surface-cleansing.

If to the ordinary solution a few drops of oil of gaultheria or cassia, or both, with a little zinc. catechu, be added, you have a fluid very pleasing to the eye and the palate, with very slight additional cost.

In conclusion, gentlemen, should the patient once become accustomed to using this, or a similar antiseptic fluid, you may rest assured that he will not depart from the habit thus formed, in sickness or in health; the mucous membrane of the mouth

will be given an opportunity to take "its" rest at night; the stomach will not receive a load of disease-producing germs at every mouthful of food, the case of "rubber sore mouth" in your practice will become exceedingly rare; and the breath of the wearer, instead of reeking with the stench-producing results of putrefaction and decomposition, will be laden with the balmy odors of cinnamon and of checkerberry; and the wearer and his friends will rise up and call you blessed; for you have made him, orally at all events, cleanly—and cleanliness, you know, is a kin to godliness.—"Archives of Dentistry."

ARTICLE III.

THE PHYSIOLOGY AND TREATMENT OF SENSITIVE DENTINE.

BY GEORGE M. KEEVIL.

[A paper read before the Students' Society, National Dental Hospital.]

MR. PRESIDENT AND GENTLEMEN:—Having been asked on several occasions to read a paper before this Society, I have always been obliged to decline on the ground of not being able to find a sufficiently novel subject for it, and although I cannot claim much novelty or originality for the title and matter of to-night's paper, yet it is a subject which is always being brought vividly and practically home to the mind of the dental practitioner, and for that reason I venture to hope that it may be sufficiently interesting to tempt you to sit it out.

In order to treat of this subject, it is necessary to briefly refer to the structure of dentine, well-known though it may be to most of you. This tissue is usually defined as consisting of a hard calcified matrix, permeated by a system of channels, which contain a process or elongation

of the odontoblast layer of cells, this layer being in connection with those immediately beneath them, thus establishing an intimate connection between the pulp and dentine. This is alone sufficient to warrant a theory that the sensibility of dentine is dependent upon the pulp, but the fact that Bœdecker has demonstrated the presence of a minute plexus throughout the whole structure of dentine, derived from the ultimate branches of the fibrils, is an additional support to such a theory, dentine thus presenting an appearance of a nervous supply analogous to that of the other tissues of the body.

Salter believed that dentine has a nervous connection both with the pulp and periosteum, and in support of this he mentions instances of dentine retaining an intense sensibility after direct communication with the pulp had been cut off by the lesion of intervening tissue. As he observes, however, it does not necessarily follow that the connection between the pulp and dentine should be by a direct radiation in the course of the dentinal tubes, it may be circuitous, and thus an outlying mass of dentine retain its sentient connection with the pulp; and if we remember Bœdecker's demonstration just mentioned, this latter view would appear very probable, and more so because we can only admit that any connection between the pulp and periosteum could only occur in that portion of the tooth which is enveloped in that membrane. It is interesting, historically, to note that John Hunter did not consider dentine to be a tissue capable of transmitting sensation; he says that "teeth are occasionally worked upon by operators in the living body without pain," but he evidently had not had much experience in the matter. It has never yet been determined how the nerves of the pulp terminate. Tomes states that they terminate in a rich plexus beneath the odontoblast layer. Boll, however, in investigating this point, found that on treating a pulp with dilute chromic acid solution, an immense number of medullated nerve fibres could be traced onward into non-medullated ones,

the ultimate destination of which however was uncertain, but he has seen them passing between the odontoblasts and taking a direction parallel to that of the dentinal fibrils in such numbers that he infers that they have been pulled out of the tubes, still, however, he has not seen a nerve fibre definitely to pass into a canal. His observations have been controverted by Magitot, who recently stated that he had fully satisfied himself that the nerves of the pulp become continuous with the stellate layer of cells, and through the medium of these with the odontoblasts. If this latter view be correct, the sensitiveness of dentine would be accounted for, without the necessity that nerves should actually enter it, for the dentinal fibrils would then be prolongations, so to speak, of the nerves, and as Tomes says, it is not necessary to assume that the dentinal fibrils should actually be nerve fibres, for many animals of a low organization are capable of sensation, although they have no demonstrable nervous system.

The foregoing facts plainly point to the conclusion that a certain degree of sensibility in dentine is normal; on histological grounds, there is also the following fact that dentine loses all sensibility on destruction of the pulp. Whether this degree of sensibility varies or not at different ages is uncertain. I have been unable to find statistics bearing on this point or upon another interesting point, and that is, what relation, if any, the sensitiveness of dentine bears to the state of the rest of the nervous system at the time of observation. With regard to the latter question, Dr. White in an article in the *Dental Review* mentions two or three cases in which a highly nervo-sanguineous temperament was accompanied by an exquisitely sensitive state of the dentine, and in one of them in which the children inheriting the parent's temperament were also affected with a like condition; more statistics, however, are required to show whether this was merely a coincidence or not. It is also said that the teeth of young persons, especially those just arriving at the age of puberty, are ex-

ceedingly sensitive, and to be more particularly marked in girls. It was formerly supposed that in aged, or senile dentine, the fibrils atrophied or became calcified, and that in consequence sensation was gradually lost, but Wedl proved that they were still there, and also retained their property of imbibition, it is only fair therefore to suppose that they still retained their sensibility. Regarding the uses of the sensations in dentine nothing definite is known. Mr. Coleman is inclined to accord them a special function, probably tactile, by which we are enabled to judge of the nature of substances which come under their action, and also to judge of the requisite amount of mastication, for it is an undoubted fact that persons with artificial teeth find at first considerable difficulty in ascertaining when their food has been sufficiently masticated; but it appears to me that this function, which is entirely dependent upon pressure, is more probably performed by the periosteum. It is suggested that the most likely use of the sensation is to give warning of the encroachings of caries, and to be intimately connected with the throwing out of secondary dentine. Being pretty well agreed, therefore, that a certain degree of sensation in dentine is normal, we must regard any exalted state of such sensibility as a pathological condition, but to what this hyperæsthesia is due is a matter which has been very violently discussed, without any definite conclusions being arrived at, the most usual thing to do in order to get out of the difficulty is to put it down to inflammation. The only thing which can be said against it is that the dentinal tubes are too small to admit blood corpuscles, but even this is a false objection, as there are countless numbers of immature corpuscles, the so-called "microcytes," which are capable of being exuded into the tubes. Thomas Bell, in endeavoring to establish the inflammatory theory says, that in many cases after breaking open a tooth, immediately after extraction, where the pain and inflammation had been severe, he found distinct red patches in the very substance of the dentine. He also

states that on the examination of teeth of persons killed by drowning or hanging, he found the whole of the osseous part of the teeth, with the exception of the enamel, tinged a deep red. He places this against the objection of John Hunter and others, that the teeth have never been satisfactorily injected, and he especially mentions the case of a patient who died from jaundice, in which the dentine was found to be of a bright yellow colour. Amongst modern authorities who are in favor of the inflammatory theory may be mentioned Drs. Harris and Taft, but the worst of it is that no treatment based scientifically on this theory produces any satisfactory results.

Another and more plausible suggestion is, that the pulp itself is really the seat of the exalted sensibility, and the fibrils are merely the agents through which external impressions are conveyed to this central organ. Rational treatment based on this hypothesis would be the administration of such drugs, as acting on the nervous or circulatory systems, or both, should lower this exalted. Experiments involving the use of nervous and arterial sedatives have not tended to confirm this theory, although morphia is said to be of use in such cases as those which I have before mentioned in which great sensitiveness of dentine was a peculiarity of a nervous temperament, but in these cases, however, the hyperæsthesis cannot be considered to be a pathological state.

Another suggestion to account for this peculiar condition is, that it is caused by the crowding into the dentinal tubes, of bacteria, when disturbed by an exciting cause, and so causing pressure on the fibrils. Dr. Willmot's opinion is, that hypersensitive dentine as a pathological condition is analogous to that condition known as "teeth on edge," and is produced by the same general cause, the irritation of an acid. He says, that in these cases of "teeth on edge" from eating sour fruit, &c., the acid is concentrated and abundant, passing through pores and cracks in the enamel, acts on the peripheral extremities of the fibrils, and

causes such irritability in the dentine that the slightest impact or change of temperature causes pain. He goes on to say that in the hyperæsthesia generally observed in general practice, associated with caries, the irritating acid is very dilute, so that the effect is produced slowly, requiring for its manifestation greater changes of temperature or some chemical or mechanical injury, as the cut of an excavator, the difference of the two conditions being in degree only; in the former the irritant being in action for a short time only, and so soon becoming diluted with saliva, that an exalted sensibility rapidly subsides; in the latter the irritation due to an acid condition of saliva, is persistent, and the hyperæsthesia soon becomes chronic.

I have now to pass to a more practical point, namely, treatment. The internal use of morphia has already been alluded to, the conclusion being that it is only of use in cases of systemic nervousness, and being a dangerous drug to play with should be excluded as much as possible from use by the dental practitioner, the risks not being counterbalanced by satisfactory results. In cases in which the sensibility is referable to an acid state of the secretions, a removal of the cause will at once suggest itself, cases such as these, and which occur so frequently in children, are easily corrected by the use of alkaline remedies, such as bicarbonate of soda or potash.

In such cases as are not included in the above, a lot may be gaining the confidence of the patient, by tact of manner and touch, and by proper use of sharp instruments, but it is in those cases, such as erosion cavities, in which the dentine is so hard as to require the determined use of the dental engine, which gives so much trouble, and to find a remedy for this class of case the whole *Materia Medica* has been ransacked from one end to the other, with very indifferent success. Dehydration by means of absolute alcohol, followed by warm air is one of the first things which should be tried, its apparent action being the subtraction of water from the organic material in the dentinal tubes, causing its contraction.

The next most primitive method of treatment is the application of creasote or carbolic acid, the latter by preferance. Carbolic acid is a drug in which the relative dryness of the cavity and maintenance of the strength of the application produce proportionately satisfactory results, but it requires to remain for two or three hours to do any good. Dr. Flagg considers this drug to act in a two-fold way, both by forming insoluble phenates with the organic constituents of the dentine, and by anæsthetizing to a slight degree the pulp, rendering that organ less susceptible to irritation.

The next on the list of this class of remedies is a very favorite one, chloride of zinc; in using this drug it is absolutely essential that the cavity be as dry as possible, as success depends upon its being diluted, and in order to secure this, it has been recommended to place small pieces of it in the cavity and allow them to deliquesce of their own accord; fifteen minutes is usually sufficient time for this drug to produce its effects, unfortunately, however, its application is usually attented with intense pain, and I am not aware that any means have yet been found for avoiding this. Occasionally, in deep seated cavities, the application of chloride of zinc produces pain of a beating kind; it is an indication that the pulp is being affected, and this should be at once controlled by washing the cavity out with warm water and introducing a little oil of cloves.

Side by side with chloride of zinc may be placed nitrate of silver, which is said to affect the dentine to a greater depth and to be less painful, but the unfortunate discoloration which it produces is an effectual bar to its use, at any rate in front teeth.

The last of this series of drugs is arsenic; but although this substance is undoubtedly the best obtunder at present known, its use is almost unanimously condemned on account of its deleterious effect upon the pulp. If, however, its use is resorted to as a last resource, Dr. Harris recommends 1-40th grain to be applied and allowed to remain

for about an hour. It is doubtful, though, whether its employment is justifiable for the purpose of simply obtunding dentine.

Among other remedies may be mentioned tannin in alcoholic solution, in creasote or in glycerine, sulphuric acid and cocaine, oxide of calcium, and the frequent administration of small quantities of nitrous oxide gas, has been said to be efficacious in some cases. These have all been used with more or less success, but their action appears to be very uncertain.

With regard to electricity as applied for the purpose of treating sensitive dentine, Dr. Harris mentions the galvanic cautery as being useful.

Dr. Flagg states that in many cases he has found galvanic electricity of great use in obtunding, but that it does not always bring about the result. He uses it by placing one pole of a large bichromate battery on the gum over the root of the affected tooth, the other being placed in the cavity, each pole for better connection being tipped with sponge; it probably acts by producing a retraction of the organic material in the dentinal tubes, in the same way that electricity is known to cause the contraction of protoplasm, when applied to it as a stimulant.

In concluding my short paper, gentlemen, I trust that you will attribute its brevity to lack of material, not to want of painstaking in trying to get it together.—*London Dental Record.*

ARTICLE IV.

ASEPTIC AND ANTISEPTIC DENTISTRY.

BY H. M. CLIFFORD, D. M. D., BOSTON, MASS.

[Read before the Harvard Odontological Society, March 27, 1890.

Aseptic and antiseptic surgery, special and general, is interesting, if not of great practical importance to the general dental practitioner. To the more careful and painstaking dentist, the subject has considerable import.

My attention to this subject was awakened more than ever by the very interesting and instructive line of experiments conducted by Dr. H. L. Burrell and assistant, G. R. Tucker, of this city, and given in a paper before the Massachusetts Medical Society. The deductions, made from most excellent investigations, struck me as those which should more directly reach the ears of the dental profession; and as I have seen no record of similar experiments in any dental journal, I resolved to make this subject the theme of my paper. Not having time to enter into experiments of this nature myself, you will accept that which is especially interesting or applicable to our specialty.

Our knowledge of that science which is so successfully aiding the present operations of eminent surgeons, is not extensive; and we shall profit in noting the work of the more advanced scientists in our own ranks—Black, Miller, Sudduth, and many others.

The science of bacteriology furnishes great aid to practical surgery at the present time. The full benefit of this science will not be realized until schools of medicine (and I hope dentistry will be continued as one of its special branches) educate their students in this direction, and surgeons become more familiar with both the principles and details of the work.

Aseptic healing of wounds was long ago heard of.

Fortune favored operations by excluding or destroying the germs, no matter what precautions were taken. Detail after detail has arisen, had its day, and died out; changes will continue, but beneath this rests the foundation which moveth not; the principles of asepticism and antisepticism. That sources of contamination exist in every detail of operative surgery is shown by the experiments I quote below.

I will first mention the result of experiments made on the toilet of the surgeon. The most scrupulous care should be exercised in providing for cleanliness of the hands. Its applications to us as dentists is not so absolutely necessary, but will simply show how careful a person may be and yet be loaded to the finger tips with germs. Note the following experiments:

A man's left hand was selected, the nails cut and cleansed, the hand vigorously scrubbed with soap and water, washed with ether and immersed in one to one thousand (1-1000th) solution of corrosive sublimate. It was kept immersed for one hour, removed from the sublimate bath, washed with sterilized water, and a layer of gauze placed on the front and back of the hand. This was covered with sterilized nutrient gelatine, and over this was applied an antiseptic dressing. The man's right hand was then cleansed in the way a surgeon often does before an operation—that is, by cleansing the nails of all visible dirt; scrubbing the hand with soap and water, and immersing it for a moment in a one to one thousand solution of corrosive sublimate. It was rinsed in sterilized water and treated similarly to the left hand.

A half hour later, these dressings were removed and cultures made. The left hand, the one with which great care was taken, was absolutely sterile. The gelatine of the right hand, the one in which the customary precautions were taken, showed colonies of bacteria; more from the back of the hand than from the front.

The result is striking, and demonstrates that the

ordinary way of cleansing the hands is ineffectual. Nail brushes were examined and found to be swarming with bacteria.

A noticeable fact in connection with the above experiment is, that corrosive sublimate, momentarily applied, is not absolutely germicidal. It requires a longer time to act in the strength of one to one thousand than has heretofore been expected.

As corrosive sublimate is destructive to instruments, it was hoped hydronapthol, which is perfectly harmless, would successfully sterilixe them, but it was found to be unreliable in the experiment of a bulldog forcep immersed six hours in an alcoholic solution (1 to 500), complete liquefication from the germs being the result. In a knife treated the same way, better results were realized, the knife being found perfectly sterile.

Experiments by heat were made, and found to be very efficacious.

Sterilization by interrupted heat, leaving interruption for development of spores, is a most certain method.

Boiling, unless interrupted, is not an absolute means of sterilization.

Continuous heat is quite effectual.

A few instruments, after being sterilized, fell upon the floor, and were again examined, and found to be covered with germs; showing the atmosphere of the room, as well as the floor, to be full of germs.

An experiment on instruments by using carbolic acid one to forty, submerged for one hour, showed bacteriologically to be little better than those not treated at all.

Experiments with steam were not satisfactory.

Baking for a few hours gave certain results.

Great care should be exercised that no germs are retained within a wound. Operative wounds, if properly treated, are aseptic, as in the immediate destruction of a pulp. Accidental wounds are more or less septic, as in dead pulps of long standing.

Antiseptic dressings, as carbolized or boracic acid and iodoform cottons, are rarely sterile.

Gauze, saturated with a ten per cent. solution of glycerine, dried and baked, makes a most perfect aseptic dressing; if this same dressing is charged with corrosive sublimate, it makes an admirable antiseptic absorbent.

That germs come from the circulatory system, seems to be proven by an experiment on dressings removed from a wound which had healed without pus; the outside layers having no germs, while the layers immediately in contact with the skin, contained considerable numbers. The germs not coming from outside sources, must come from within.

After considering these experiments, it seems surprising that we as dentists have anything like success in treating diseased mouths and teeth. The knowledge gained from these experiments, if carefully and intelligently applied to dental operations, must have its good effect. Nearly all the observations made by Dr. Burrell should be applied by dentists in treating diseased mouths, exposed and inflamed pulps, and in filling and treating root canals. That a single operation heretofore performed by dentists was bacteriologically prophylactic, I sincerely doubt.

Antiseptic precautions should be more closely observed. I have been in the habit, of late, of treating all foul teeth by the most thorough germicidal applications, namely, corrosive sublimate, 1 to 500, heat, etc., applied with the rubber dam in position.

As the dose of bichloride of mercury, internally administered, ranges from 1-30th to 1-10th of a grain, and being immediately absorbed and giving no poisonous results, it doesn't seem possible that a quantity necessary to a foul pulp or abscessed tooth should give any fear of ill effects. I do not recommend it for anything but foul pulp canals, and then to be used with a knowledge of the significance of the drug. When not using the bichloride as above, I syringe the root canals with a solution of corrosive sublimate, 1 to 1,000 dry, pump up hydrogen peroxide,

wash with ether—when the odor is not objectionable—dry with hot air, then apply the root canal dryer, which I consider, at present, the best means of applying heat directly to the roots, keep that in the canals until the roots are practically dry, then I apply a pledget of cotton, moistened with the oil of peppermint or deliquesced carbolic acid and seal up; being careful not to plug the root too tightly. I repeat this as often as I consider necessary, which is rarely oftener than twice, perhaps three times, intervals between such treatment being about a week or ten days.

When the roots appear to be restored to a healthful condition, I proceed to fill with oxychloride of zinc, which, if carefully and intelligently applied, makes one of the best of root fillings. A root thoroughly sterilized will not, when filled with a good filling (e. g., oxychloride) be troubled with an abscess. Oxychloride in a partially sterilized root, when irritating the parts beyond, by its affinity for moisture, will resolve itself without giving further trouble. If pushed through the apex, it will undoubtedly give trouble from its escharotic action, with its consequent evil effects.

It has been said by Virchow and others that the human organism may be considered as a vast battle-field, in which there is a constant conflict between the component cells and micro organisms. Disease or inhibition of the cells gives to the micro-organisms an opportunity to gain the ascendency; destruction of the tissue, putrefaction and pus formation are the results. Miller's experiments (*Independent Practitioner*, 1884 and 1885) prove oxychloride, when first mixed, to be a powerful antiseptic. If it does its work when first introduced into a root canal, and properly excluded from the action of the saliva and mucous of the mouth, it comes as near being a perfect antiseptic root filling as any material we have at our command. The objection of disintegration cannot apply to this material, when used as a root filling. Under a securely tight capping, like a copper amalgam, the only way in which disintegration could take place would be through the apex by

the circulatory system, which, to my mind, is very doubtful. In teeth with large apical formina, I would not advise the use of oxychloride as a root filling. I never attempt to fill roots with this preparation when patients are not in the best of health, preferring to use a material I could remove very easily and quickly, if the case called for it.

I never had occasion to regret the use of oxychloride as a root filling but once; and I must confess it was a sad mistake, or accident. For the benefit of those who, I hope, have never experienced the same result, I will relate this operation.

I was treating for neuralgia. Everything was conditioned, with the exception of a left superior lateral, which had been filled on both the mesial and distal aspects with large gold fillings, done by a reputably good operator, and gave every indication of being a perfectly healthy tooth, good color, etc. Upon further examination, however, I found on the gum, a point which looked as if it might at one time have been a fistula. The patient also stated there had been one. The fistula having healed, I was loath to probe it, so I proceeded to enter the root canals. The root canals proved to be free from any foul odor. I applied dressings, sealed, and gave the patient another appointment. At the next appointment, after cleansing and using the customary precautions, I proceeded to fill with my oxychloride. I noticed it was taking more material than usual, became curious, investigated, and found the parts in the neighborhood of the closed fistula, which was heretofore apparently normal, betraying a disturbed condition, probed and found my oxychloride pushing toward the opening. I predicted trouble, used my syringe, applied oil of cajuput and tannic acid, hoping to prevent or counteract the escharotic action of the oxychloride, and dismissed the patient, telling her to call on the morrow. She did so, after passing a sleepless night. The parts were very much inflamed and very sore. In a few days the inflammation subsided, and the part corresponding to the fistula sloughed,

which, upon being removed, exposed the condition of the root. From its chronic condition, the labial part of the root, as well as the alveolus on the same side, had been completely dissolved or absorbed, leaving sharp corners and rough edges to cause irritation. I was at a loss to know what to do, and sought the counsel and advise of our ex-president, Dr. Briggs. Suffice it to say, that after following his advice, the patient's neuralgia was cured.

It was also necessary to bring into requisition the services of Dr. Stoddard in baking a piece of gum porcelain which perfectly matched the natural gum; and now a healthful looking tooth is presented, with all traces of neuralgia removed.

Since that time, I have occasionally adopted other antiseptic fillings for root canals. One which I sometimes use, and consider a very fair root filling, is a cement made of tannic acid and a strong solution of gum benzoin in alcohol, and evaporated to a thick consistency. It makes a resinous cement, which forms quite a solid body. I have also applied it in deep-seated caries, as a non-conductor and astringent, but as it darkens the tooth, I gave it up.

I have also used hydronapthol crystals, heated to a resinous mass, and worked into fine canals, and covered with copper, with good results. It is especially applicable to teeth of the lower jaw.

In capping exposed pulps, where I am afraid of irritation, I use a saturated solution of hydronapthol or listerine as a germicide, applied when warm, and capped with paper or sheet lead, with a covering of cement, preferably oxysulphate, the latter not being so harsh as most of the calcined oxyphosphates.

Before closing the paper I will mention some of the popular antiseptics of the day. The virtues of carbolic acid, creosote and the essential oils are generally understood, and need no word here, with the exception, perhaps, of the oil of peppermint, which is of late attracting more than a passing notice.

The latest *International Medical Annual*, in speaking of the oil of peppermint, says it is readily diffusible, is superior to iodoform, in that it does not mask in any way the odor of any of the discharges. It possesses the special property of checking suppuration, independently of its antiseptic action; is as powerful as, but more penetrating and diffusible than, corrosive sublimate; is absolutely harmless, and is consequently the safest and best of all known antiseptics.

The peculiar action or influence of iodoform over the production of pus, is not as yet quite satisfactorily explained, and it is said to have no germicidal action. Its odor is quite enough to warrant dentists in adopting some substitute.

Creoline, the so-called latest of the best antiseptics known, a proprietary preparation of the coal tar series, resembles very much, and probably is the same thing as pixine, used in England for many years; is unirritating and a cheap disinfectant, but giving an unpleasant or shoppy odor to the office. It is slightly astringent.

Copper amalgam, I am inclined to believe, is an admirable antiseptic filling, and if judiciously used, is an important addition to any operating table.

By means of the rubber dam, an operation on the teeth may be more safely treated with good germicides.

The saliva ejector also plays its part in connection with cleanliness in an operation, and should always be used with patients who have difficulty in swallowing the saliva while the rubber dam is in place.

While it is a very difficult thing to attain absolute antisepticism, yet, practically, it may be gained by attention to details.

Thorough cleanliness is a preventive of sepsis.

Germicides, well applied, in sufficient quantities or strength, will inhibit the development of aseptic germs.—*Archives of Dentistry.*

Communications.

POST GRADUATE DENTAL ASSOCIATION OF THE UNITED STATES.

Editor of the American Journal of Dental Science.

The annual meeting of the Post Graduate Dental Association of the United States was held at Chicago, June 25, 1890, and the following gentlemen were elected officers:

President; Geo. H. Cushing, M. D., D.D.S., Chicago, Ill; Vice-President, Dr. R. H. Cool, Oakland, Cal; Secretary and Treasurer, Lewis S. Tenney, D.D.S., Chicago, Ill. Executive Committee, R. B. Tuller, D.D.S., Chicago, Ill; Dr. J. M. Gallehugh, Chenoa, Ill; Dr. G. W. Milton, Silvertown, Colo.

This association is but a year old, but it starts out with good prospects of becoming a large and popular national organization, and has a grand work before it. Its object aside from the same general one of most Dental Societies is to particularly encourage and stimulate post graduate studies and the establishment of facilities for the same in Dental Colleges. It also contemplates, when its membership will admit of it, establishing a systematic course of home study with benefits not unlike the Chatuaqua Literary Society perhaps, but the plan is not yet sufficiently developed to admit of outlining at this time.

While the name "Post Graduate" would imply an association of graduates only, the broad view is adopted of of extending the work among all legal practitioners who may desire to join and co-operate, but practitioners not graduates are not eligible to membership until they have past a post graduate or practitioners course in some reputable and recognized Dental College.

Members of the profession who desire to become

members of the Post Graduate Association should correspond with the Secretary, Dr. Lewis S. Tenney, 96 State St., Chicago. The membership fee is $1. Annual dues, payable in advance $1. Certificates of membership are issued when the member duly qualifies. Membership may be obtained through correspondence when evidence of eligibility is presented.

CHLORIDE OF METHYL SPRAY.

Editor of the American Journal of Dental Science.

DEAR SIR:—At a meeting of the Brooklyn Dental Society, held on Monday, March 24th, 1890, the following resolution was offered and adopted:

RESOLVED, That a copy of the last section of the report of the chairman of the Clinic Committee, relative to the chloride of methyl spray, be forwarded to each of the dental journals, with the request that they publish the same. In consideration of which, I herewith enclose a copy of said section, and sincerely trust you will give it space in your journal,

Very truly yours,

LOUIS SHAW, *Secretary.*

The following is a copy of the last section referred to:

"At a stated clinic of the Brooklyn Dental Society, held at 444 Fulton street, Brooklyn, on Monday March 24, 1890, Dr. M. L. Rhein repeated his clinic with chloride of methyl, and satisfied all present that he has suggested the most efficient and painless anæsthetic for sensitive dentine yet introduced. It is undoubtedly better than the spary from a nitrous-oxide cylinder, which was described and demonstrated recently before the Odontological Society, in New York. Your committee thinks this agent of so much consequence to us, and the method such a boon to suffering humanity, that it suggests that a copy of this part of the report be sent to all leading journals, that the matter may be brought to the attention of the profession in a prominent way, immediately.

"It has been previously demonstrated that dehydration produces anæsthesia in dentine, and that sprays have this effect. But all sprays, except this, produce considerable pain. The chloride of methyl spray acts so instantaneously that the pain is only a momentary shock at most, and is not complained of by the patients. It may seem that this is a strong report from your committee, but since the last clinic your committee has thoroughly investigated this method and seen it satisfactorily demonstrated in a large number of cases."

CHICAGO DENTAL SOCIETY.

CHICAGO, May 13th 1890.

Editor of the American Journal of Dental Science.

At the annual meeting of the Chicago Dental Society, held on Tuesday, April 1st., 1890, the following officers were elected for the ensuing year: President, C. N. Johnson; First Vice-President, C. H. Thayer; Second Vice-President, I. A. Freeman; Secretary, A. E. Baldwin; Corresponding Secretary, T. L. Gilmer; Treasurer, E. D. Swain; Librarian, A. W. Harlan; Geo. H. Cushing, to succeed himself on the Executive Committee; C. F. Hartt, E. A. Royce, and S. B. Palmer, Board of Censors.

T. L. GILMER,

Corresponding Secretary.

Editorial, Etc.

THE LAW OF THE STATE OF VIRGINIA REGULATING THE PRACTICE OF DENTISTRY.—The law regulating the practice of dentistry in Virginia, being Chapter LXXIX, Code of 1887, amended and approved January 28, 1890, (amendments in italics,) is as follows:

SECTION 1767. Who may Practice Dentistry.—From and after the passage of this act it shall be unlawful for any person to engage in the practice of dentistry in *the Commonwealth of Virginia, or to assist in the practice of dentistry as either assistant or employee*, or to receive license from any commissioner of revenue, unless such person has graduated and received a diploma from the faculty of a reputable institution where this specialty is taught, and chartered under the authority of some one of the United States, or of a foreign government, *acknowledged as such, and* shall have obtained a certificate from the board of examiners duly appointed under the provisions of *section one thousand seven hundred and sixty-eight of Code of eighteen hundred and eighty-seven*, to issue such certificates; provided, *that persons who shall be engaged in the practice of dentistry in the Commonwealth of Virginia on the first day of January, eighteen hundred and ninety, and who shall comply with the requirements of section one thousand seven hundred and seventy-four of this act shall be otherwise exempt from the provisions of this section; and provided further, that nothing contained in this section shall prevent a student who is pursuing a regular course of instruction from assisting a person in the practice of dentistry qualified as herein provided*, or shall prevent any *authorized physician or surgeon* from extracting teeth for any one suffering from toothache.

SEC. 1768. Board of examiners: their Appointment and Terms.—The board of examiners shall consist of six practitioners of dentistry, of acknowledged ability in the profession, to be appointed by the Governor. The board shall continue to be divided into three classes with two members each, one

of which classes shall go out of office each succeeding year; and the Governor shall annually appoint the successors of each class, as it goes out, for the term of three years. He shall make the appointments in each case from four persons who shall be nominated by the Virginia State Dental Association, and reside in different sections of the State. All vacancies for unexpired terms shall be filled by the Governor on nominations made by the board. If no nominations be made by the said association or board, as the case may be, or the nominations made be not approved by the Governor, he shall appoint such persons as he may deem fit.

SEC. 1769. Their Duties.—It shall be the duty of this board—

First. MEETINGS.—To meet annually at the time and place of meeting of the Virginia State Dental Association, or at such other time and place as the board shall agree upon, to conduct the examination of applicants.

They shall also meet for the same purpose at the call of any four members of the board, at such time and place as may be designated by said members. Thirty day's notice of the meetings shall be given by advertising in at least two of the daily papers published in the State.

Second. EXAMINATION OF APPLICANTS, ETC.—To grant a certificate of ability to practice dentistry to all applicants who undergo a satisfactory examination, and receive at least four affirmative votes; which certificate shall be signed by the members of the board, and be stamped with a suitable seal (which they may adopt).

Third. REGISTRY.—To keep a book in which shall be registered the name and qualification (as far as practicable) of every person to whom such certificate is granted.

SEC. 1770. Transcripts from Record Book, Evidence.—The book so kept shall be a book of record, and transcripts from it, certified by the officer who has it in keeping, with the seal of the board affixed, shall be evidence in any court of this State.

SEC. 1771. Quorum.—Four members of the board shall constitute a quorum; and should a quorum not be present on

any day appointed for their meeting, those present may adjourn from time to time until a quorum be present.

SEC. 1772. Penalties.—Any person who shall, in violation of this chapter, practice dentistry in this State, shall, on conviction thereof, be fined not less than fifty nor more than two hundred dollars, and shall not be entitled to any fee for service rendered; and if a fee shall have been paid, the patient may recover back the same.

SEC. 1773. Disposition of Fines.—All fines collected under this chapter shall go to the public school fund of the county or corporation in which the prosecution is had.

SEC. 1774. Dentists Required to Register.—*Every person practicing dentistry in the Commonwealth of Virginia, at the time of the passage of this act, shall register his name and post-office address, together with the name of the college from which he is a graduate, or the length of time he has been practicing in this Commonwealth, with the board of examiners before renewing his license, and it shall be the duty of the board to issue to each person so registering a certificate of registration stamped with the seal of the board, but no fee shall be collected by the board from persons so registering.*

SEC. 1775. Fees from Applicants.—To provide a fund to carry out the provisions of section seventeen hundred and sixty-nine, it shall be the duty of said board to collect from those who appear before them for examination the sum of ten dollars each.

Monthly Summary.

DR. B. H. CATCHING, of Atlanta, Ga., is at work on a Compendium of Practical Dentistry, which will consist mainly of the valuable matter contained in the various dental journals for the year 1890. This compendium will be a ready-reference book—a sort of annual encyclopedia of practical dentistry, and it is proposed to issue a volume each year. The price is fixed at $2.50, to be paid on delivery of book.

A DENTAL OPERATION IN WHICH TEETH BURIED IN THE JAW ARE REMOVED AND PAIN ALLEVIATED.—Anson Washburn, the fourteen-year-old son of Austin Washburn, of the Bee Line, sat in Dr. J. B. Morrison's office yesterday reading a paper and fanning himself unconcernedly. He has passed through one of the most remarkable operations known in dental surgery. When he was about five years of age he had an attack of scarlet fever that caused the retention of four teeth on the right side of the upper jaw. Dr. Morrison made an exploration and found the teeth and drew two of them down. One of them did not require much attention, except careful watching. When exploring for the eye tooth, he found it between the hard palette and the floor of the nose, pointing toward the left jaw. The tooth was imbedded in a sack of pus and the most careful treatment was needed in removing the pus and to prevent it from aggravating the cut parts and causing blood poison. The tooth and its bony attachments were cut loose, carefully cleaned of all foreign substances, and placed in its proper position. The central incisor was kept out of the boy's mouth for two and a half hours. The teeth that were changed about are growing nicely, and young Washburn said that he is suffering no pain, no inflammation has set in, and his teeth are in good condition. He was thoroughly under the influence of ether during the operation. The operation is out of the ordinary.—"Indianapolis News," June 25, '90.

OUR POSITION AT THE CHAIR.—Our position at the chair is not of small moment. By the habits of some dentists, one would suppose the patient has no rights the dentist is bound to respect. He lolls and leans and crowds on his patient, making of him his cushion, his staff and his main support, till the patient feels crushed and smothered and exhausted. We have seen a dentist so rudely lean and press against his lady patients as to be repulsive and immodest. There may be no resistance in plain English to all this, "but it is remembered" and "reported," much to the dentist's detriment.

Then, too, the dentist has rights he owes to himself. It will not do to indulge his patient in any position he may

choose to assume. Many dentists toil to the great detriment of their work, their comfort, and their health, by allowing patients to loll about, double up, or turn about as fancy pleases them. We should insist on their assuming positions advantageous to us and our work. The mere position of the head is of great importance. Some chairs are made so wide that our patients, unconsciously, get away from us, and we are obliged to lean half over them to get at our work, or have frequently to bring them back within proper reach.

But, independently of the position of our patients, there is much to be observed in our own habits of position. Standing on one leg for an hour at a time is, of course, injurious. Standing in a stooped position for a whole day is suicide. Twisting our body into a corkscrew to see our work is nonsense. Habitually leaning hard against the arm of the chair is sure to bring on internal complaints. Having our mouth so near the mouth of the patient as to breathe his breath and the rottenness in his mouth, is of course deleterious.

The dentist should stand erect, in an easy, self-possessed and self-supporting position, as much as possible. The more props and supports he has, the more he wants, the more awkward will be his position, and the more unhealthful. Spinal complaints, consumption, vertigo, and many other complaints would thus be avoided. His chair should be so easily raised and lowered, and turned to either side, and back and forward, that he can bring his patient in any position to suit his work. The head, especially should be controllable, in aspect and position, without serious inconvenience to the patient.—"Extracts from Editorial in Items of Interest."

THE DENTAL MIRROR.—This is the title of a new dental journal edited and published in the city of New York. The first (July) number was issued June 20th. The standing of this journal may be judged from the fact that it is conducted by Dr. A. Ottolengui, and we presume he receives the assistance of the able progenitors of the enterprise, who, we are informed, include the brightest professional talent in New York. The "Dental Mirror" is to be published monthly at 63 West Fifty-fifth street. Send for a sample copy.

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ARTICLE I.

IMPRESSIONS AND IMPRESSION-TAKING.

BY MR. E. BULL.

[Read before the Students' Society, London Dental Hospital.]

Mr. President and Gentlemen:—It is with great diffidence that I bring before your notice to-night the subject of impressions, recognizing, as I do, the supreme importance it bears to our profession as dental students. The value of an impression will be more fully brought home to us when we remember the fact, that no model can be an improvement on the impression; and too often the model and plate show the retrograde steps, which, should the impression remain untrue, will undoubtedly cause the denture to prove a failure.

I hope I may be able to introduce matter which some of you may consider controversial, and thus give rise to a good discussion, in which the many shortcomings of my paper may be, at least to some extent, compensated.

My intention is to deal, firstly, with the various

materials used; secondly, to briefly describe the principal methods employed in the operation of impression-taking; and, thirdly, to discuss the question of selection of material.

Firstly, with regard to the materials.

Time was, when no impression materials were used, or impressions taken, but the unfortunate patient was made to sit in a chair for days together with a well-painted mouth, whilst a block of ivory was slowly let down on the spot. We opine a good fit resulted, since no better model could be had than the mouth itself, but we regard it as questionable whether the patient or the dentist had the worst of the bargain.

A Frenchman then discovered the excellence of wax as an impression material, and for many years this substance was exclusively used by dentists. From then up to the present time, various materials have been tried with varying success, but only four are now in common use, these being wax, modeling composition, gutta-percha, and plaster-of-Paris.

For a substance to be of any value in impression-taking, there are certain intrinsic and extrinsive properties that it must possess.

These are—

The necessary softness for taking the impression (*i. e.*, it must be soft enough to copy the finest lines of the mucous membrane, but must also have that consistency which will compress the soft tissues without displacing them.)

Must possess the proper hardness for retaining its shape when removed from the mouth.

Must take a sharp imprint.

Must remain where placed (*i. e.*, have no tendency to warp or fall away.)

Must harden promptly.

With undercuts must bend or break with moderate force.

Must be available under conditions existing in the oral cavity.

Must possess no qualities repulsive to patients.

The nearer a material attains perfection in these various properties, the better adapted it will be for our use.

WAX.—The wax used by dentists is common beeswax, which forms the framework of the comb. Virgin wax should be used, and its purity is an essential condition, care being taken that it is unadulterated with tallow.

There are two varieties of wax, yellow and white, of which the former is preferable, since the process of bleaching yellow to obtain white appears to destroy many of its good qualities.

Wax is prepared for the mouth by heating it in water hot enough to thoroughly soften without melting it. It may also be softened with dry heat, but this method is not so good as the former, since wax readily melts over the flame of a spirit lamp.

MODELING COMPOSITION.—This is the latest and in some respects one of the best materials for taking many sorts of impressions. It is composed of gum damar, stearine, French chalk, with carmine to color it, and a perfume to render it pleasant to the patient. The composition varies in its consistence according to the amount of stearine and chalk introduced into it.

Modeling compound is best softened by dry heat over a spirit lamp, as water appears to injure its consistency. The impression tray should also be heated, and the composition, rolled into a ball, applied to the palatal portion, and kneaded from thence to the rim. By this means a good surface free from creases is obtained, and this may be again surface-heated over the lamp before application to the mouth.

GUTTA-PERCHA.—Gutta-percha is prepared from the juice of the *isonandra gutta* tree. It should be used in a pure state, as foreign substances tend to diminish its plasticity. Water heated to about 180° Fahrenheit should be used to soften gutta-percha. It must be worked with moist fingers, and before introduction into the mouth, its surface should be chilled in cold water; this is important,

since should this precaution not be observed, the patient will be put to some considerable amount of pain owing to the contact of the hot material with the mucous membrane.

PLASTER-OF-PARIS.—Plaster-of-Paris is manufactured from gypsum, which is ground and calcined to drive off water. It should be perfectly dry, and there is one essential condition that must be complied with in order to obtain the best results—it must be properly mixed.

The setting of plaster is a chemical process, two molecules of water being taken up to one of plaster. The nearer this proportion is arrived at, the more satisfactory will be the result. It should be mixed in a small bowl, the plaster being sprinkled in until it is entirely taken up by the water, and the mixture is of a medium thickness; it should then be used immediately.

Since pure plaster requires some time to set, it is found advantageous to introduce something to hasten the process. Of the many agents used, potash-alum, ten grains to a tablespoonful of plaster, is by far the best. Common salt is also strongly recommended, and its presence is by no means unpalatable to the patient.

It is also very useful to mix some coloring matter, such as rose pink, with the modeling plaster, so that we may the more readily distinguish our plaster impression from the true model when chipping it off during the operation of casting.

We must give a passing word to the various sorts of impression trays that are in general use. Years ago, trays were commonly made of silver, but now-a-days they get so battered about to meet the requirements of each particular case, that it is unadvisable to employ any valuable metal in their manufacture. Britannia metal (tin alloyed with lead and bismuth) makes good trays, and is probably as useful as any other material. A complete set should be kept, the operator selecting those that best suit his particular method of treatment.

Practitioners of fifty years ago found fifteen trays

amply sufficient, and Mr. Harris speaks with apparent complacence of having in one instance been absolutely obliged to make a special tray in order to obtain a correct impression. But the exigencies of prosthetic dentistry, as practiced to-day, have altered this pleasant state of affairs. It is now necessary in most cases where we are using plaster to take the impression, and in many a case beside, to make a special tray. I have no time now to go into the details of their manufacture, but I may say they may be made by such methods as striking up a piece of Britannia metal, or pouring tin.

So much for the materials employed. We will now go on, *secondly*, to the operation of impression-taking. We will first confine ourselves to general methods, and then particularize a few of the difficulties we meet with, and the means by which such difficulties may most readily be overcome.

The preparation of the mouth scarcely comes under the province of this paper, but I may mention, *en passant*, that all irritants, such us salivary calculus, roots and diseased teeth that will not yield to treatment, must be removed, and the gums and mucous membrane brought into a healthy condition, before a denture should be made, or an impression taken.

METHOD OF USING WAX, COMPOSITION, OR GUTTA-PERCHA.—We may take these three materials together, as there is little essential difference in the *modus operandi*.

Before taking the impression, the mouth should be dried with a soft napkin, and should the secretions be copious or the gum spongy, it is advisable in some cases to make use of an astringent, such as dilute phenol sodique, for some days prior to the operation.

The position of the operator should be behind and to the right of the chair, and he should be so placed that he can command a full view of the interior of the patient's mouth. The tray and material may best be introduced into the mouth by distending the left side of the lips with

a finger of the left hand, pressing the tray against the right side, and passing it in with a rotative movement. The cup should then be carefully adjusted over the arch without disturbing the material, and then pressed up until all the parts are imbedded. The patient may then be instructed to draw down the upper lip, and external pressure on the projecting material must be applied all round the alveolar ridge with the finger, an operation especially important with undercuts. With a good impression, the atmospheric pressure will be great, and difficulty will be experienced in removing the tray, this being best effected by elevating and depressing it with quick firm movements, thus causing the introduction of air between the palate and impression.

The material should be fairly hard before removal is attempted, and the setting may be hastened by the application of ice-cold water on a napkin. Owing to the smallness of the mouth, or the strength of the orbicularis oris, it will often be found difficult to introduce the tray. This difficulty must be overcome with gentleness, the use of force only tending to make matters worse. With irritability of the fauces and adjacent parts, causing retching and uneasiness, we should gently paint these regions with a camel's hair brush, with camphor water, or employ a gargle of the same.

METHODS OF USING PLASTER.—In the use of plaster, the patient should be placed upright in the chair, with his head inclined slightly forwards; the breathing may safely be left to itself, but he should be directed not to swallow during the operation. The drying of the mucous membrane is especially important before taking a plaster impression. The cup having been introduced into the mouth, should be pressed up with the rear slightly in advance of the front, in order to prevent any plaster escaping at the heel and causing irritation of the fauces, or dropping down the throat.

It is especially important that the back edge of the tray should fit the palate when plaster is used for the impression.

If it does not, a bridge of soft wax should be built across it, conforming in shape to the palate.

It usually takes from three to four minutes for the plaster to set, and no attempt at removal should be made until a clean fracture results on breaking a portion of the surplus in the bowl. The tray may then be withdrawn as in wax impressions. Fracture of the plaster will usually result, and the pieces must be carefully collected and fitted on to the tray.

Instead of making a special tray for the use of plaster, another method may be adopted. A rough impression in wax is taken, and a layer varying in thickness from ¼ to ⅛ of an inch, tapering towards the rear to prevent a surplus of plaster in that region, is trimmed from this. The wax should then be deeply scored and undercut, a thin surface of plaster run on, and another impression taken.

We will now describe a few of the more difficult cases to be met with in impression taking.

The most common of these is a dovetail space between two teeth. Two or three excellent methods of operating are open to us.

The offending teeth may be dried, and a small piece of wax fitted on to the undercut portion; this must be well vaselined before taking the impression, or if plaster is being used, wax cut-offs may be employed, causing a fracture of the plaster down the middle of the dovetail.

If the case be such that a complicated fracture is unavoidable, a good plan is to fill such spaces with plaster, which when set must be trimmed so that no undercut exists and it should then be coated with gum sandarac. Having taken the impression, the portion in the dovetail may easily be removed by slitting it transversely almost to the gum, when it may be fractured without being defaced, and fitted into the impression.

Another common difficulty is a deep undercut. Wax and composition are of little use, although gutta-percha may meet the requirements of the case, but undoubtedly,

particularly if the mouth is edentulous, plaster is the material to use, and it is in these cases that wax cut-offs are extremely serviceable. Strips of wax are placed in the tray, forming a ridge corresponding to the alveolar process of the jaw; two transverse strips may also be placed at points corresponding to the position of the canines. The cup, being oiled, parts from the plaster, is allowed to remain in the mouth. This, when set, is broken off by the operator, the cut-offs anticipating the fractures, and allowing him to remove the whole impression in four or five large portions. The palatal portion may be removed with a special hooked instrument.

There is an excellent method of procedure in taking plaster impressions where only one or two teeth are standing, in which the use of cut-offs is avoided. Strike up the tray so that it touches the crowns of the standing teeth, proceed as above, and the pieces of plaster will fracture across the weak spots above the teeth.

A difficulty often presents itself in mouths where there is protrusion of the front teeth. An ingenious tray has been invented by Mr. David Hepburn, to meet these cases, called after him, "Hepburn's Sliding Section Tray." It consists of an ordinary tray, with the rim in front cut away, this portion being made to slide along the handle, so that when pushed up it comes into its normal position. The method of operating is to take an impression in composition with the body of the tray, not allowing the material to overlap the protruding teeth; a piece of composition is then placed on the sliding rim, which is pushed home. The two portions may be readily removed, separately, with dragging.

I may also briefly mention here, Kingsley's method of taking impressions for artificial palates.

When the palate is merely perforated from accidental causes, no special apparatus is required, as only the boundaries of the foramen need to be defined. Great care must be taken, however, in these cases, not to use too

much impression material, since the surplus may be pushed up into the nasal cavity, in which case great difficulty will be experienced in removing the tray.

But with congenital clefts, it is essential that the entire borders of the fissure from the apex to the uvula, also the form of the cavity above the palate should be perfectly represented in the model.

An impression of the lingual surface must first be taken, plaster being used with the greatest success. The next step is to take an impression of the nasal surface of the hard palate. This can be done by filling the lower portion of the cavity above the roof of the mouth with soft plaster, and while it is yet quite soft, carrying the palatal impression against it, having first soaped its surface to prevent adhesion between the two. The two portions may be easily removed separately, the nasal part being carried backward and withdrawn from the mouth with a suitable pair of forceps. The irregular surface of contact indicates their relations when the two are brought together.

Let us, *thirdly*, discuss the relative merits of the various materials used in impressions.

It appears to me in impression-taking, as in all other branches of our profession, we are too apt to settle down into a routine, and from either laziness or want of enterprise, we jog along in a circumscribed area, enunciating and practicing our own views; and thus losing sight of or entirely disregarding the many advantages which may attend another style of operation.

Gentlemen, I can only bid you beware of conservative methods; it behooves us to move with the times, and to make ourselves masters of new theories and new practices, although undoubtedly we should assure ourselves of their advisability and efficacy before bringing them into general use.

I do not hold with the modern craze for plaster impressions. I am quite aware that we shall be told in the ensuing discussion that men taking wax and composition

impressions cannot even compete with those who use plaster. Well, all I can say is, that wax and composition have competed and do compete at the present day with plaster, and what is more, with the greatest success. Do not misunderstand me; I would not eschew the use of plaster for impressions. On the other hand, I think nothing else can be used in some mouths, such as edentulous jaws with deep undercuts, and cleft palate cases.

It speaks well for wax, that for so many years it was the only impression material used, and although times have changed, yet the callow student of to-day, who uses plaster indiscriminately for everything, would be perhaps surprised at the sharp impression that can be got by a practitioner skilled in the use of wax and composition.

It is the abuse, rather than the use, of wax that has brought it into apparent disrepute with some.

Gutta-percha is extremely serviceable, but it appears to want a great deal of practice for anyone to become proficient in its use. The great virtue of this material lies in its elasticity and power of regaining its original shape, which allow of its employment in undercuts, where wax or composition would be practically useless. Gutta-percha shrinks very considerably in cooling, and hence is used by some in taking impressions for regulation plates, thus securing a tight fit.

In selecting our material, there are two conditions to be borne in mind; a minimum of inconvenience to our patient, and a maximum of convenience to ourselves. For whatever we do, we must remember that a patient seldom feels at home in the operating chair, and anything which will tend to increase his discomfort must be avoided, as far as is compatible with good practice. In this fact lies one of my great objections to plaster as an impression material, for let men say what they will, plaster is very obnoxious to the patient, even with the greatest care. I advisedly leave incompetency out of the question, but probably in nothing is bad operating more painfully apparent, or more discom-

forting to the patient, than in taking a plaster impression.

Again, our own convenience is to be considered. With the plastic materials we have very little trouble, but with the plaster impression, the necessary preparation, together with the striking up of a special tray, and the subsequent fitting together of the fragments, are sources of great loss of time, and I fear too often of tempter as well.

To sum up these remarks, as a general rule I recommend the use of wax, composition, or gutta-percha, since they are the most comfortable to the patient, and the most expeditious for ourselves, resorting only to plaster when these materials can not be used with any hope of success.

In conclusion, I have to thank you for your kind attention, in listening to my attempt to discuss a subject which after all is more practical than theoretical.—*The British Journal of Dental Science.*

ARTICLE II.

OBSERVATIONS ON THE STRUCTURE AND DEVELOPMENT OF OVARIAN TEETH.

BY T. CHARTERS WHITE AND J. BLAND SUTTON, F. R. C. S.

The subject hitherto had not been investigated in a manner commensurate with its interest, and it was taught by Mr. White and himself that it would be of value to place before the society some facts in connection with this subject. They were unable to state the age at which these teeth developed, for they found children of five, seven, and ten years of age having dermoids with teeth fully erupted. Quite recently they had the opportunity of observing an ovarian in a girl aged seven, and this contained teeth well developed with fangs; the ovarian also contained a lock of

hair thirty inches in length. Dermoid cysts in adults and old women would frequently be found, on examination, to contain no teeth. They are equally unable to state the age at which ovarian teeth are shed. Now they knew that the hair in ovaries becomes grey, and the cysts become literally bald, but an edentulous dermoid, in the sense that the teeth have been shed, had yet to be demonstrated. The number of teeth in dermoids varied greatly, in many—probably half, perhaps more—none were detected; when present they were frequently overlooked, and so statistics were unreliable. Two, three, or four teeth is a common number, but if they contain twenty they might be described as numerous. Ovarians have been met with containing 300 or 400 teeth, one on the table contained 350 teeth, a large multilocular dermoid. The structure of these teeth had not previously been carefully described. Only two papers of any importance had been written, one was by Mr. Salter, published in *Guy's Hospital Report*, 1863, and the other by Mr. Coleman, published in the *Transactions* of this Society. But neither went into the matter with any thoroughness. Now, in so far as these ovarian teeth consist of enamel and dentine they correspond with ordinary teeth. They are lodged in bony sockets, and these are lined with periosteum. The bones in which they are lodged are developed afterwards, because in many instances such teeth are lodged in the soft tissues of the tumour; sometimes they are embedded in a piece of bone and look like so many pieces of nails projecting from a piece of wood; and then again, in their early stages they are unassociated with any cartilage. They really correspond to the alveolar process of the jaw, and this was a matter of some importance, because it had given rise to the theory that they are instances of a retained fœtus; the skin and the hair attaching to them gives apparent support to the theory. The fact of the bone being developed round the teeth makes them look very like the alveolus of the upper jaw, and it was perfectly wrong to describe them as due to a retained fœtus. These teeth

agree with normal teeth, inasmuch as they consist of enamel and dentine, that is to say, they would find a body of teeth all formed of dentine radiating regularly enough so far as the crown of the teeth is concerned from a central pulp chamber. In the multi-cuspidate teeth they had this regular dentine, and on the top of that a lot of rough hummocky enamel. The other forms of teeth are like bicuspids. There was a remarkable relation of the enamel to the normal enamel on definite pulp chamber; between the dentine and the enamel, there are the usual interglobular spaces such as are seen in the normal teeth. Attention should also be drawn to the fact that in some of the teeth these hummocks of enamel have very deep clefts, or ravines between them, which in a later stage are filled up with fibrous tissue. In the case of the enamel, the fibres run in all sorts of directions, and although enamel, dentine, and cementum would be found in apparent normal relation, there was in reality the utmost disorder. The amount of cementum is variable, in many teeth it is absent, in some teeth it would be found coating only one side of the fang, but the dentine and enamel are constant. In all these teeth there was only one fang; so far as Mr. Sutton was aware no observer had seen an ovarian tooth with more than one fang. In the cuspidate teeth there was what botanists would call a "tap root." The bicuspids, incisors, and canines had much longer fangs than the multicuspidate teeth. When the crown is long, the fang is short, and inversely when the fang is long, the crown is short. What was more remarkable, these teeth had no pulp-chamber: this was noticed by Salter and also by Coleman. In the multicuspidate teeth sometimes pulp would be found, and sometimes not; in some the pulp is ossified. In some specimens the whole of the pulp is replaced by fat globules and blood. The existence of nerves in the pulp has been demonstrated by Salter, in the paper of 1863 referred to, and Mr. White and Mr. Sutton had been at considerable pains to see if they could get some nerves in pulps, for

Salter's observations had never been confirmed, and as yet they had met with no trustworthy specimens. Quite lately two specimens had come into their possession which seemed to give some indications in support of Salter's view, but their appearance under the microscope was too uncertain to warrant any definite conclusions and so for the present that part of the investigation required more work, though ultimately they expected to be able to demonstrate the presence of nerves. That nerves do exist in dermoids was beyond question, because one of the authors of the paper had had opportunities of experimentally showing this; for instance, the patient in these cases is often able to localize the pricks of a pin with the same certainty as in other parts of the body. Furthermore, there is a peculiarity in the character of the pain arising from dermoids, so that it had been possible to suggest the nature of the tumour from the description of the pain.

So much for the structure; now for the development. So far as Mr. Sutton was aware, no previous observers had described, or figured, or given any satisfactory evidence, as to the modes in which these teeth are developed. Recently Mr. White and himself had been able to trace their development. In dermoids, bodies composed of cells named epithelial pearls are found. The cells are large, but become compressed as they approach the peripheral part of the pearl, and ultimately become lost in the environing capsule. After their enclosure such pearls may increase in size from the growth of the enclosed cells. The epithelial pearls are worthy of close study, for they are allied to enamel organs, and indeed may be regarded as enamel organs, for in one of the illustrations one of them might be seen descending upon a dental papilla beneath like an avalanche. One involved the head of a papilla like a normal enamel germ. These germs lack a definite follicular wall which might possibly explain the deficiency and occasional absence of cementum to the fang. As yet they had not succeeded in detecting any evidence of germs

of secondary teeth. It is remarkable that these pearls may remain cellular or give rise to enamel. The relationship of epithelial pearls is of interest in another direction; the pearls had been most closely studied in the median line of the hard and soft palate, as a rule they are small in size but occasionally act as tumour germs, and give rise to neoplasms known as palatine adenomata. It had recently been pointed out that such pearls are occasionally associated with papillæ in the meso-palatine suture, and gave rise to a not uncommon phenomenon, viz., a meso-palatine tooth. In conclusion, much remained to be investigated in ovarian teeth, especially with regard to their character when growing in the ovaries of other mammals.

Mr. Charters White, commenting upon the microscopic specimens which he had prepared, said the forms which had been supplied to him might be assigned to the molars and bicuspids, but were not of the form of normally developed teeth. The molars were stunted in their growth and finished abruptly at their necks in some cases, while in others the root extended as a single tap root brought suddenly to a close. The most striking feature about the molars was their well pronounced and numerous cusps separated from each other by deep fissures. The bicuspids might in many instances have been taken for multiform, canines, the apical foramina in some cases were quite absent. The enamel presented a sodden appearance and was perforated with holes resembling those met with in any worm-eaten wood. On cutting sections with a dental engine and diamond disc or wet piercing saw, the perforations before noticed on the enamel entered and traversed the enamel in tortuous tubes, as if bored by some annelides. The enamel prisms presented every degree of granularity, and were frequently marked by those cross striations usually found in imperfectly developed enamel. The most marked irregularity was perhaps observed in the dentine; the dentinal tubuli were there, but seem to have followed no definite course, presenting a most turbulent

appearance. The cementum had been small in quantity in the specimens, and presented no features for special notice. The extraordinary absence of pulp cavity in many teeth was worthy of remark: in all but two cases the pulp was wanting, and in those it was very fragmentary. In conclusion it would be a waste of time to describe irregularities which were not constant.

DISCUSSION.

Mr. Arthur Underwood had come with a very open mind, but still he thought it would be unfair to so able and carefully prepared a paper to allow it to pass without at least some kind of attempted comment. In the first place it would be generally recognized that Mr. Bland Sutton and Mr. Charters White had thrown a great deal of fresh light upon their subject, and he was of opinion that their paper would form a classic. Recently he came upon a case published in a Boston paper, it was a careful description of teeth lodged in two bones which resembled the parietal bones separated from each other by a suture. The teeth were called plainly molars and bicuspids, but they did not seem to Mr. Underwood to be anything of this plain description. He would be happy to give Mr. Bland Sutton the reference to the case if he desired. His next point was in connection with Mr. Sutton's remark that he did not believe there was any recorded instance of ovarian teeth with more than one fang; well, it was a dangerous thing to suggest that Mr. Sutton was possibly in error, but it seemed to Mr. Underwood that the specimen No. 994, which Mr. Sutton had passed round, had 2 fangs at the top; possibly if the bone were chipped away it might prove not to be so. Another point was a reference to epithelial pearls, possibly Mr. Bland Sutton was not aware of some interesting researches from the pen of a Frenchman who discussed these formations at great length, and endeavored to prove that at times they were abnormal teeth, and at other times they were tumours. That reference he would

also be pleased to give Mr. Sutton. With regard to the disorder of the tissues, it was obviously present, and he thought such disorder was always present in an abortive attempt to form a tooth. It was present when the pulp forgets to do its natural work and endeavors to form secondary dentine. When there were secondary teeth made they were always of a disordered kind. Of course, Mr. Bland Sutton was careful to cut the particular section illustrated through the centre of the tooth, though it looked from the drawing as if it might be a little off the the pulp. He would be glad if Mr. Sutton would put them in the way of obtaining such specimens as were exhibited. He (Mr. Underwood) would for his part promise to cut them, examine them, and report upon them. In conclusion he thought the society would be able to do greater justice to the paper later on.

Mr. Charters White said he had been careful to cut the specimen as near the median line as possible with a diamond disc and a dental engine. He must say that he very much regretted that he was unable to get more than two sections out of one tooth, therefore he cut each tooth into two sections, and he ground that down pretty flat and polished it so that he thought that they had obtained one side of the median line. He added, at present transverse sections had not been obtained.

Mr. Storer Bennett thought the society was to be congratulated upon the extremely able paper to which they had listened. And as this was the first occasion that Mr. Bland Sutton had been out after a severe illness, they would take it as a very great compliment that he had come down to deliver the paper himself. Mr. Bennett was exceedingly interested in hearing Mr. Sutton's remarks as to enamel being deficient on the crowns of teeth reminding them of the fissures that were to be seen in molars and bicuspids. Mr. Sutton said that at the bottom of these fissures there was fibrous tissue. Now on the authority of Charles Tomes it was known that they had Nasmyth's

membrane, and it was very remarkable, as Mr. Sutton had pointed out, that cementum was either not present or was exceedingly thin; that instead of cementum on the Nasmyth's membrane there should be fibrous tissue, Mr. Bennett wished to ask whether he was correct in inferring that Mr. Sutton had found no trace of the membrane passing across the teeth.

Mr. George Cunningham (Cambridge) simply rose for the purpose of asking a question, viz., whether any caries had been found in these cysts. His reason for asking the question was, that at Buda Pesth he saw a cyst of the same nature containing carious teeth. His impression, from noticing Mr. Bland Sutton's specimen, was that caries was present in the various kinds of teeth.

Mr. Gharters White, a casual observer might very often mistake some of the foramina for caries. They were brown and corroded, no polish at all on the surface, and they seemed to be eaten into by holes, more like worm holes than anything else, but with perfectly defined borders.

Mr. W. A. Maggs asked for information as to the condition of the multilocular cysts. And with regard to the multicuspidate teeth that seemed altogether exceptional, could Mr. Sutton give any more facts about them?

Mr. F. J. Bennett said that Mr. Bland Sutton's paper induced speculation in the absence of any apparent rational cause for certain departure from the usual course. With reference to calcification, Mr. Sutton had told them that there was no pulp cavity in the teeth from which the section was taken. If they looked at the secondary calcification nodules, which took place in the pulp chambers in old teeth, it seemed to begin in the middle and extend outwards. Might not these teeth, which were so eccentric in many ways, develop calcification in a precisely opposite manner? *i. e.*, commencing outwards and working towards the centre. It seemed quite possible, indeed more probable, as Mr. Sutton had said that in many of the teeth there was no cementum, or only very rudimentary indeed.

Mr. Bennett remarked that in Richard Owen's "Odontology," published many years ago, there was a fine litho of an ovarian tooth, and in it there was no pulp cavity.

Mr. Bland Sutton replying said he was extremely indebted to Mr. Arthur Underwood, and should be glad to be favored with the references to the papers he mentioned. He might say, as to the tooth having a bifid fang, that upon looking at it again he thought Mr. Underwood was probably right. He (Mr. Sutton) had examined many hundreds of these teeth from bifurcated roots without finding them, that at last he supposed he must have got careless. But it was a point that he would take the earliest opportunity of putting beyond dispute. Should Mr. Underwood's view be correct, it would only modify the paper to the extent of stating that bifurcated roots were "of the greatest rarity," instead of that "they were unknown." Now with reference to caries, although he had intentionally excluded the subject in delivering the paper, it had in reality been included in the paper which had been prepared by Mr. Charters White and himself; that caries occurred in ovarian teeth was an assertion which would not hold water for a moment. These ravines in teeth always contained fibrous tissue. Caries in the teeth contained in ovarian dermoids in the sense employed for mouth teeth had yet to be demonstrated. With reference to Mr. F. J. Bennett's remarks, it was a curious thing that both Coleman and Salter had noticed that dentine radiates from the line rather than the pulp chamber. However, it showed the value of bringing a question of that sort before a society instead of writing the subject up in one's study, and packing it off to a journal. In thrashing a subject out before a society many valuable suggestions were often made in the course of discussion. With reference to Mr. Maggs' question, he would say that any number of teeth over twenty or fifty in these cysts was most rare. The dermoid before them was most exceptional. There was nothing peculiar about the teeth, but it would not be wise

to draw any conclusion from them. In conclusion, he wished to say that the discussion had been a most profitable one to him.

The President said it afforded him a great deal of pleasure to offer the thanks of the Society to Mr. Bland Sutton and Mr. Charters White for their most interesting, able, and suggestive paper. They were all greatly rejoiced to see Mr. Sutton restored to health again, for had the illness been fatal it would have been a loss, not only to their society, but to the whole scientific world. The next meeting would be on the 14th April, when they would have a contribution from Mr. Henry Sewell on some points in the etiology and pathology of dental caries, illustrated by photo-micrographs of the tissues shown upon a screen by Mr. Andrew Pringle. There would also be a casual communication from Mr. Scott Thomson on splicing engine cords.—*Proceedings of Odontological Society of Great Britain.—London Dental Record.*

ARTICLE III.

GOLD AND TIN IN SAVING TEETH.

BY C. R. BUTLER, D. D. S., M. D., CLEVELAND, OHIO.

[Read before the Northern Ohio Dental Society, at Canton, Ohio, May, 1890.]

An old and interesting theme, yet ever new. First, because it has value; and then it must be ever new to the army of recruits that is added to the profession annually. And how shall they be able to take up improved modes and means of practice, unless these things are set plainly before them, as having passed the ordeal of time test, which is the prover of the faithful as well as the unfaithful efforts?

This subject—the combination of the two metals, in

the same fillings—has claimed considerable attention, more especially the past few years.

The chemico-galvano electric feature of the presence of the metals in the teeth, the writer will not attempt to discuss at this time, that feature of the object having been brought before the profession by teachers of dental chemistry.

But we will take it up from a practical standpoint, and advantages observed after years of testing.

If some sixteen pages of arguement in one of the leading journals can be given to prove the great value of gutta-percha as an adjunct in dentistry, the writer will venture a few suggestions on the use of tin as a permanent filling in teeth.

How shall this be accomplished, for it is said that it wears out, no matter how well it is put in? Let us see whether this be true:

We will take, for example, proximal cavities in molars, or bicuspids, decay up to or under the free margin of the gum. The dam being adjusted, the preparation of cavity should be made with as much care as for gold, with angles as square as practicable, with slightest possible bevel of side margins of cavity, whether it be a deep or shallow cavity, so there shall be no feather-edge lap of metal on border of cavity when the filling is finished. Presupposing that working room has been secured, if possible would place a wedge between the teeth by the gum to hold them steady, then slipping a piece of steel down by lower margin of cavity, (the writer prefers an adjustable, rather than the closed band matrix.) We are now ready to commence the impactment of the filling, whether foil or fibrous tin be used in mat, strip, or pellet, by the operator, the all-important item being to have the metal packed into a solid mass; if this be done, close impingement upon the wall and border of the cavity will be secured.

It may not be out of place to mention the kind of instruments and force employed by the writer; the ordinary

foot shape serrated points, (same instruments shown), with hand force in most cases; the hand mallet is also a good adjunct.

Having filled one-fourth or half the bulk of the cavity with tin, cut shallow retaining pits and grooves in the strong part of the tooth, and finish out the filling with non-cohesive or cohesive gold; it is not at all safe to depend upon the gold being driven into the tin alone for anchorage, to stand the force of mastication. But if the plan suggested be faithfully carried out, good safe contour fillings can be made.

One great cause of failure in the use of tin filling is, the operator does not start out with the idea that it is anything but an inferior material, and that fillings made with it are only temporary. But he who is fully imbued with the idea that the first and last object in filling teeth at all is to *save* them, and uses tin, *a la* Corydon Palmer, (who gave the writer instruction and hints many years ago, of the possibilities of tin,) will find that his works do follow for many years, not to condemn, but to encourage to be more and more faithful.

To all young subjects that require operations, the above mode of treatment of some cavities, proximate and buccal, is to be commended, for it is conceded by the best of operators that children's teeth are better saved with tin than with gold.

Tin has a fiber as well as gold, and should be cut with the fiber. No. 10 foil I prefer, taking a sheet in the hands with a to and fro movement, crimping it both ways, giving it a working property when cut into strips lengthwise of fiber, and rolled into soft cylinders of the size and length desired.

Do not think of applying to some manufacturer for made-up tin, but learn to prepare it for the case in hand. There is too much dependence on these "made-up" articles; they are often a misfit.

Some may decry this system of filling because it may

be abused by the man who puts in more tin than gold, and represents to his patients that he is giving them gold operations. But that has the same degree of honesty that there is in representing that they are giving them first class gold fillings, that fail to give the comfort and service that should be had from plastics.

This mode of operating is neither cheap nor does it admit of an inferiority of skill in the technique. The plea that is made by a recent writer against contour and in favor of face fillings, that time and tax upon patient and operator are greatly lessened, has but little force in cases where a contour filling is demanded. And the man who attempts to fill all teeth in the same manner, or carry out some pet system, has failed to comprehend the factors that have so much to do in making operations upon the teeth at all necessary, and is scarcely worthy the name of dentist in this active age of careful observation.

If we are members of a "learned" profession, the laity have a right to expect better services than was obtainable by their ancestors. We often speak with pride of the wonderful advances made within the past half or quarter of a century in the art and science of dentistry, but the query often comes to me, are we doing as much to-day with all the boasted knowledge of the minute structural make-up of the teeth, and the almost endless fine adjuncts in the operative department to prevent and arrest decay of the teeth, as the men who had to depend so largely upon their individual effort for ways and means to meet the demands for dental work?

Whether it be a chemical or mechanical effect that the tin has upon the dentine, is still a mooted question. But we have observed that the higher the degree of vitality or predominance of animal matter in the tooth, the less it tolerates gold as a patch! So putting the tin where the major part of the cavity is dentine, then finishing out the masticating surface where enamel is mostly the receiving surface of the gold, the teeth are better preserved than

when all gold was used! In many cases a mere line of tin is used along the basal margin. I have never been in favor of folding or rolling tin and gold together, but use them in definite sections.

The mode and results as given here are from actual practice. After years of testing, whether it be considered orthodox to declare such a line of practice, matters but little. My aim has been and is to make operations that save. One more example and I close this article. In cases where decay has made considerable inroads upon the proximate surfaces of the incisors, the structure of teeth is such that I should regard it the best kind of practice to open the cavities from the lingual surface. Secure as good borers as possible, fill with tin with a lining of non-cohesive gold under the face or labial wall, to modify the blue appearance that the tin might give the teeth. The matrix may be used to advantage in most of these cases, giving nature a chance under such fillings to harden the teeth.

No claim or care for priority is sought to be developed in this mode of using metals, as here presented. All operations, in fact, are but temporary.

But after years of careful observation of the mode and means employed to reach this class of cavities by men of skill and integrity, with the results following, I do not hesitate to put myself on record in support of this mode of making permanent fillings with tin and gold.—*The Ohio Journal of Dental Science.*

ARTICLE IV.

THE CARE OF THE VULCANIZER.

BY GEORGE B. SNOW, D. D. S., BUFFALO, N. Y.

The occasional reports of explosions of dental vulcanizers, accompanied as they are by more or less damage to property, and imminent risk of personal injury, renders the question of their avoidance one of considerable interest. Their entire prevention is an impossibility, so long as the management of the vulcanizer is entrusted to boys, or persons who know nothing and care still less about the properties of steam, or the rules upon the observation of which depend the safety and proper operation of the machine committed to their charge. It is seldom, if ever, that inquiry into the circumstances attending a vulcanizer explosion fails to elicit the fact that it was the consequence of gross carelessness or ignorance. The safety apparatus is often deliberately put out of order, and all the chances of an accident which may happen from a few moments' forgetfulness are taken by the operator, who probably knows about as much of the properties of steam as a Christian scientist does of human physiology.

It is proposed, in the present article, to touch upon a few points in the matter of the proper care of vulcanizers, and more especially to show how and when they become unsafe by use. It seems to be the opinion of some dentists that a vulcanizer should remain good indefinitely; but it is often the case that one returned to the maker for supposed trivial repairs, is found to be in such condition that its further use would be attended with great risk.

Vulcanizers, as they leave the manufacturer's hands, may be depended upon as strong enough to withstand a pressure three or four times as great as that incident to the

vulcanizing process. No house, having any care for its reputation, can afford to put out one unless it is of undoubted strength. They are also provided with ample safeguards, by means of which they will be relieved from over-pressure, if it should occur. But no such appliance can be made which cannot be—either ignorantly or designedly—put out of order; neither can a vulcanizer be made so strong that it will be safe under any attainable pressure. It must be carefully and intelligently managed to insure safety.

Vulcanizers are gradually weakened and eventually destroyed by corrosion. The original thickness of the metal is fully preserved at the bottom of the pot, and there is but slight deficiency at the mouth. The action is almost wholly upon the sides, and at the middle the metal wastes away until it is scarcely thicker than heavy paper. Still a vulcanizer was used until it had reached this state of deterioration, without giving way. This shows how little strength is really required to withstand the pressure due to the vulcanizing temperature, if care is taken that it be not exceeded.

When the sides of the vulcanizer are weakened by corrosion to any great extent, the fact is easily ascertained by tapping them lightly with a small hammer. If the metal is thick and strong, it will be elastic, and the hammer will rebound from a light blow, though of course copper would yield to a heavy one. When the metal is quite thin, the sensation will be as though the blow were delivered upon lead. There will be little if any rebound, and the metal will be driven in and dented by a very light blow.

Corrosion occurs to a certain extent from exposure of the vulcanizer to air and moisture. Indeed, it is by no means sure that the greater part of it does not thus take place. It is good practice to clean the vulcanizer pot, and wipe it dry before laying it away after use.

Another cause of failure in vulcanizers, one which happily occurs but seldom, is the cracking of the metal

near the corner of the bottom. As the bottom is usually covered with scale, it may crack and even give way before the existence of any defect is suspected. This fact forms another argument for keeping the vulcanizer clean, as before mentioned.

When a screw fastening like that of the Whitney vulcanizer is employed, mischief is often done by the inordinate use of black-lead or soap-stone powder upon the packing point, and incidentally upon the screw. The particles of which either of these powders are composed, are hard enough to wear away metal if placed between two rubbing surfaces, and in consequence the screw threads of vulcanizers are sometimes so worn that they have not sufficient hold upon each other to retain the cover; which on some fine day mounts to the ceiling, and disappears in the lath and plaster, much to the surprise and disgust of the owner.

The reason for applying soap-stone or plumbago powder to the surface of the packing seems, in many cases, to be entirely misapprehended. Its only office is to prevent the packing from sticking to the edge of the pot. A minute quantity only is required for this purpose, and its application need be made but seldom. If it is applied too liberally or too often, it will form a thick coating on the surface of the packing, which will be porous and will be the cause of leakage. When the coating attains any great thickness, it will scale off; and the leakage, which may have been almost imperceptible before, will now be increased to such an extent as to be annoying. Possibly the dentist does not detect the cause of the trouble, and, thinking that the vulcanizer "works hard," applies oil to the thread. This is burnt by the heat of vulcanizing, and the cover is virtually cemented to the pot. It is now removed with difficulty, if at all. As a rule, when the packing of a vulcanizer is in good order and steam-tight, the less that is done to it the better.

There is another matter connected with the management of the vulcanizer, which frequently causes great an-

noyance if not properly understood. If the vulcanizer is too full of water, not allowing adequate room for its expansion when heated, a pressure will be developed much greater than that due to the production of steam. The safety disk will in this instance be blown out, possibly at as low a temperature as 280° or 300°. Or if the safety apparatus be put out of order, the vulcanizer pot may be bulged and stretched out of shape, or a rupture may be the result, and a so-called explosion ensue.

It must be remembered that water is inelastic, and that when it is confined, with inadequate room for its expansion, the resulting force is practically irresistible. It is an easy matter, if the vulcanizer be wholly filled with water, to obtain a pressure of six, eight, or nine hundred pounds to the square inch, without heating the water to the boiling point. Is it any wonder that they sometimes give way when carelessly used?

A safe rule is to allow one-sixth at least, better one-fourth, of the capacity of the vulcanizer for steam room. The user of a vulcanizer should never lose sight of the fact that it is a steam boiler, and is subject to deterioration by use. The rules for its management should be thoroughly read till clearly understood, and carefully observed, and after the vulcanizer has been in use for a time it should be inspected frequently, and any signs of weakness carefully noted.—*Dental Advertiser.*

ARTICLE V.

NOTES ON A CASE OF SYPHILITIC CLEFT PALATE, WITH ITS TREATMENT.

BY E. LLOYD-WILLIAMS, L.R.C.P., LOND., M.R.C.S., L.D.S., ENG.
[Assistant Dental Surgeon to the Dental Hospital of London.]

A woman, 37 years of age, applied at the Dental Hospital of London for relief under the following circumstances. About seventeen years ago she had acquired syphilis, which in its tertiary stage had caused severe ulceration in the mouth and throat. Upon examination, all active ulceration appeared to have ceased, the soft tissues being firm and healthy. The hard palate was extremely cleft from a point immediately behind the anterior palatine canal, a large quantity of bone having been removed as a result of the syphilitic periostitis; there was also a large gap in the alveolar border anterior to the cleft. The mucous membrane covering the hard palate was intact with the exception of an opening the size of a goose-quill at about the middle of the palate, and one somewhat larger, anterior to it. The soft palate was very slightly split from below, through, and as far as the base of the uvula, while the free edges were glued to the walls of the pharynx. The nose was thus completely cut off from the pharynx posteriorly, with the exception of a small opening where the soft palate was fissured. One sound bicuspid remained, all the rest of the teeth being either absent, or represented by loose and unhealthy stumps. The loose stumps having been removed, and the alveolar tissues brought into a healthy condition, the question remained as to what might be done to relieve the patient in speaking, eating, and drinking. It was doubtless desirable, in order to improve the vocal articulation, as well as to make swallowing more easy, that the soft palate should, if possible, be freed from its attachment

to the pharynx; and on this point I obtained the opinion of Mr. Bland Sutton, who thought that there was very little chance of successful interference.

It was then decided to afford what relief was possible by mechanical means. An impression was attempted in plaster of Paris, with most disastrous results; and as the accident was a somewhat uncommon one, an account of it may be of some slight value as a warning to others. The tray was an extemporized one, formed by cutting out a wax impression in an ordinary tray; into this the plaster was poured and pressed into place. When the impression was removed, it was found that the plaster had run through the two openings in the palate, and becoming confluent, formed a fairly large mass which was retained within the nose. The mass was split up as well as possible into small fragments, and by means of forceps, syringe, &c., several pieces were removed. The patient departed, and when next seen, complained of considerable inconvenience from a foreign body in the nose. On examination it was found that a tolerably large lump of plaster still remained imprisoned. As it was difficult to seize and crush, it was decided to divide the soft tissues between the two openings, thus forming one larger orifice. This was done, but the bony edges of the cleft prevented the escape of the plaster. Crushing was then resorted to, followed by syringing strong streams of water in all directions. Tampons of cotton-wool were eventually passed through the narrow pharyngeal opening, in both directions, but all to no avail with regard to one piece which evaded all our ingenuity, so the patient, being thoroughly exhausted, was once more dismissed. Four days later a happy solution of the difficulty occurred by the patient finding the piece of plaster in her mouth. I need scarcely add that nothing will induce me in the future to use plaster for impression of this description.

Ultimately an impression was taken in composition, and a very light vulcanite denture made, which not only acted as an obturator, but also proved of great comfort both

in speaking and eating. At the part where the loss of alveolus was most pronounced, the plate was made hollow; and as this method of lightening vulcanite dentures is useful in a large number of ordinary cases, the *modus operandi* may be described for the benefit of those who may not be acquainted with it.

The plaster model is carefully dried, but the oral surface, untouched by stearine or any other hardening agent, must be kept clean and free from dirt or grease. The case is now built up in the ordinary way in wax, and flasked in *three parts*—the only safe method with which I am acquainted—the original model in the lower part, the teeth and labial aspect of gum, embraced by the middle part, and the palate covered in by the third part of the flask or *plug*. In other words, this method of flasking is the *contour* method *plus* the splitting up of the first part of the investment into two operations. Almost any ordinary roomy flask may be made available, if the lid be drilled and a good strong tag riveted on to it. Having boiled out the wax and dried thoroughly, the pink gum is carefully packed all round the teeth in the *second* part of the flask, and put away to keep just warm. The first part is now taken and the model painted with a solution of the rubber to be used in methylated chloroform. At the spot where the hollow chamber is desired a thin layer of rubber is pressed over the surface with the fingers, and then with hot smooth oval-surfaced packer shaped into a deep saucer-like cavity, the surface being made sure by a layer of rubber solution. The first and second parts of the flask are now brought together in a vice and secured by pins or wedges. The remainder of the packing is now done from the palate, the contouring being complete except the lid of the hollow chamber. Having cut an overplus channel at the heel of the plug, paint the surface of the plug *opposite* the lid of the chamber with rubber solution, and press on one thickness of rubber. Place two or three drops of water in the cavity; put in the plug, avoiding pressure; keep in an upright position whilst

placing in vulcanizer; and screw home when the gauge stands at 25 lbs. If these steps are carefully taken various chambers of different shapes may be made in ordinary edentulous cases, when the matter of weight—and sometimes porosity of rubber—become a serious consideration. The method of flasking and packing described is in my opinion the only one for general purposes which is absolutely reliable. Properly carried out it become impossible to raise the bite, or to produce that *piebald* appearance of gum caused by the erratic wanderings of rubber, which is *not* artistic although common, and which patients unfortunately sometimes take exception to. I know it is dangerous—especially in mechanical matters—to appear to dogmatize on a subject to experienced persons, but perhaps some of the younger students who read this may care to try a method of flasking which will save them a good deal of heart-burning in the future days of busy practice.—*London Dental Record.*

ARTICLE VI.

ROOT-FILLING IN ITS RELATION TO DISEASE.

BY RODRIGUES OTTOLENGUI, M. D. S.

[Read at the Anniversary Meeting of the Second District Society held at Newburgh, N. Y., June 9, 1890.

It has been recently charged that we of the Dental profession have no definite methods; and the diversity of opinion as to root-filling was cited as an evidence of the correctness of the statement. It is the purpose of this paper to show that there are different methods of filling roots because the conditions vary, to describe briefly some of the more constantly occurring phases, and to indicate in each the best method of filling the root.

It seems to me unfortunate that many men are filling

all roots in one way—that they adopt a pet system and use it in all cases. The more observant dentist differentiates between differing conditions, and has chosen a method which seems best adapted to each.

The main points in dispute are:

1. Shall the canal be enlarged, or not?

2. Shall the root be dressed with medicament? and if so, with what?

3. Shall the root be filled at the first sitting?

4. Shall we rely on one filling-material for all cases? and if so, which shall it be?

To all of these queries the replies must be variable. The first three may be answered "Yes" and they may be answered "No." The last question is the one which is most disputed, mainly because few men have tried many materials; but the true answer, as in the other cases, is that the material must be dictated by the condition.

Thus, I cannot consider the subject in the order of these queries, but will rather choose to take it up in an orderly consideration of the different conditions in which teeth are presented to us, discussing each problem in its relation to each state of disturbance.

The first conditions, and the simplest, is where a patient presents with an aching pulp. There are three subdivisions of this class, each of which must receive notice if we are to be thorough in this discussion.

(A) The tooth has ached slightly, and it is decided that the pulp must be destroyed. Let us suppose that arsenic is applied, and that on the following day the pulp is removed entire, with slight pain. The procedure is simple. With the pulp before us we determine exactly the size of the canal. If it is sufficiently large to insure thorough filling, it need not be touched with a reamer, but should better be filled as it is. Immediate root-filling is indicated; delay is dangerous—the inviting home for bacteria should be filled at once. Shall a medicament be used? I think that a coagulant is here indicated, and

that the one better than all others is chloride of zinc. Chloride of zinc is also a circumscribed caustic. On general principles, I should say not only that a coagulant is not useful in a pulpless tooth, but that it is actually harmful and therefore contra-indicated. Therefore the statement that it is indicated in a tooth from which a pulp has recently been removed entire needs explanation and is open to argument. Whether we consider the contents of the canaliculi of dentine to be neural tissue, or merely a lower order of animal matter which has the power of conveying impressions to the pulp, we are all agreed that they receive their life impulse from the pulp and not from the pericementum. This is shown by the absence of sensation in pulpless teeth, and further by the occasional discoloration of such teeth. This, then, is my reason for suggesting chloride of zinc in the class of teeth under consideration. The pulp being removed, and the medicament applied, what results? The escharotic property is exerted at the point immediately in contact, and the animal matter is destroyed. But this action is circumscribed. Somewhat deeper, a coagulum is formed. But there is another property which that agent possesses, and that is the *mumification* of *animal tissues*. This, I conceive, is what occurs in the minutest portions of the tubuli. Experience has shown me that teeth thus treated do not discolor to an objectionable extent.

(B) Condition similar to last, but, upon endeavoring to remove the pulp, excessive hemorrhage is produced. It becomes impossible to remove the pulp except in shreds, because of the tenacious attachment of the odontoblastic layer to the canal walls. In the first condition I said that if the size of the pulp as seen indicated that the canal was large, a reamer is not to be used. This implied that if the canal were small, it should be enlarged. But it is different in this second condition. Not only are we in doubt as to whether we have removed all of the pulp tissue, but we are reasonably sure that odontoblasts are still cling-

ing to the canal walls. A reamer is the only sure way to become satisfied that the canal is thoroughly cleansed. If used, it will be found that at first the debris is stained with blood; but later it is found to be pure white—a satisfactory evidence that all is thoroughly accomplished. At this point, of course, we are to consider the use of a medicament. If the hemorrhage ceases, the procedure is the same as in the last instance—a dressing of dilute chloride of zinc for a few moments, followed by immediate root-filling. If the hemorrhage is uncontrollable, a dressing of equal parts of oil of cloves and creosote may be used, and the tooth temporarily filled. If the patient can return in two or three hours, it would be well to fill the root at such a time. It should be done as soon as possible.

(C) . I come now to a condition which I have never seen explained, though one which I have met frequently. Patient presents with aching tooth. Diagnosis pulpitis, although no actual exposure is to be found. Arsenic is applied. Patient returns in a few hours in increased agony. Dressing is removed, and in succession all the drugs in the office are used to relieve the pain, but are ineffectual, till finally the pain becomes more bearable, lessened by the time which has elapsed since the removal of the arsenic. Patient is dismissed with some soothing agent in the cavity. Reports next day that a most uncomfortable night has been passed. Tooth found to be less sensitive to the touch, and decay is thoroughly removed. Approaching the pulp, however, evidence of vitality is found, and arsenic is cautiously applied in small portion. The experience of the day previous is repeated, and recurs for several days. In a case of this character the patient suffers greatly from pain and exhaustion from loss of sleep, and the operator is amazed to find arsenic so inefficient. Perhaps he buys a new supply. The diagnosis is simple if the symptoms are exactly as described, and the method of procedure the only one which will save the patient several days of torture. In these cases the pulp has begun to calcify. Frequently the

entrance to the chamber is filled with pulp stones. These form an effectual barrier to the full activity of the arsenic, but sufficient enters between the globular masses to produce the great disturbance which results. As soon as the patient returns the first time complaining that the pain is unendurable, and it is found the soothing agents do not give relief, an anæsthetic should be administered and the pulp stones and the pulp itself removed while the patient is unconscious. The canal should be reamed out as thoroughly as possible, and the root filled at once. The coagulant is contra-indicated here, because nature has already cared for the contents of the tubuli. They are in a condition which will not change from the removal of the pulp; and the only change of color which will occur in the tooth is that dense and somewhat oily appearance by which we always detect teeth which have calcified pulps.

Having described these three subdivisions of the first class of teeth, we may now discuss filling-materials and the method of filling. It has been charged against a reamer in a root canal, that it is manifestly impossible to ream around a curve. This is not entirely true. Where the canal is tortuous, there being a curve along its main length, the flexible reamer, which has a safe end, in the hands of the expert, converts the passage into a straight canal by removing the curve walls. When there is a sharp angle at the extremity, the safe end of the reamer bars farther progress and guards against drilling through the tooth at that point, which not only would frequently result in disastrous consequences, but deceives the operator into believing that he has merely passed through the foramen, whereas in fact he has not reached the foramen at all, but leaves uncleansed that curved portion. Having reamed a root which has a sharp angle at its extremity as far as the safe point will permit, an exploration is made with a flexible unbarbed broach, and on removal the presence of this curve is indicated by the bend in the broach. This being known, the canal is reamed even larger if possible, to allow

free approach to this danger point. Then Dr. Evans's silver-pointed root-dryer is heated and used, the hot fine point being readily forced into this curvature, so destroying any pulp tissue which may be left at that point, and by searing the walls sufficiently enlarges the canal at its extremity for the ingress of the filling-material to be used. In these cases I use a thin oxy-phosphate pumped in with a fine instrument till I am satisfied that the walls are smeared thoroughly. I then complete the filling by sliding into the mass a cone of gutta-percha. My object is this: The cone serves a double purpose; it forces the soft oxy-phosphates ahead of it, and it renders the root-filling more easy of removal should future exigencies make this necessary, as, should the crown be lost and an artificial substitute be needed. We should never fill roots with any material which cannot be removed. This is why wood, which some use, is especially to be avoided. Wood cannot be pulled out, and it is difficult to be drilled out.

The second condition to be considered is where the patient has allowed the pulp to die, and shortly after presents in great pain, suffering with pericementitis. This is familiar to all of us. The tooth is sore to the touch, the patient wants relief, and yet does not wish to submit to an operation of any kind. I sometimes give an anæsthetic and thoroughly open the entrance to the canal. Occasionally it will be sufficient to tie a silk ligature around the neck of the tooth and allow the patient or assistant to pull on the tooth while the engine work is being accomplished. Access being obtained to the chamber, it remains to remove the dead and putrescent pulp. Nothing which comes to us is more difficult to accomplish without pain to the patient or, by pushing a portion of this dead material beyond the apex, causing an infection which will result in abscess. Peroxide of hydrogen is useful in this place, but must be handled with extreme caution. In the first place, be sure that the agent is neutral. It is difficult to keep pure, and many manufacturers add a little sulphuric acid

to it for the purpose of preserving it. This may be detected with test papers or other chemical tests for acids. If you are sure that you have a pure article, it may be used with a syringe, a few drops being forced into the canal, the needle not being pressed in to any depth. Allow a few moments to elapse, that the whole mass may become saturated by capillary attraction. Then remove the dead pulp as may be most readily done, the circumstances indicating the method. At this initial sitting—the tooth being quite sore—a reamer should not be used, but a paliative dressing of one of the essential oils should be gently placed in the root and covered with a temporary stopping. Should the tooth be elongated to an extent which makes it painful to close the mouth, the following method of procedure is attended with the happiest results: Take an impression of the affected tooth and that on each side of it, using 24k. gold, about 34g.; swage up a splint (three continuous crowns) which will cover the three teeth. This splint is fastened in place with cement, and a hole drilled through corresponding with the cavity in the tooth under treatment. This effectually prevents any pressure from being brought to bear on the tooth in occlusion, and does not interfere with the subsequent dressings. These dressings must be renewed daily until all soreness has subsided. They are to be preferably of the essential oils, no coagulant of any kind being under any consideration placed in the canal. It may be as well to mention here some of those agents which may and which may not be used. I copy from the list published by Dr. Harlan: The oils of cloves, cinnamon, cassia, turpentine, sassafras, camphor, cajeput, sanitas, boracic acid, chloroform, eugenol, eucalyptol, myrtol, benzol, and several others may also be used. Liquid vaseline is a non-coagulant. It is usually prepared with a trace of benzoic acid. As vaseline by permeating the dentine makes it thereafter less permeable to water, an excellent dressing is found if you mix liquid vaseline with any of the oils named, or, better, with eugenol.

The coagulants which are frequently used in teeth, and yet should not be so used, are alcohol—how frequently men use this to dry a canal!—carbolic acid, camphophenique, aromatic sulp. acid, tinct. iodine, tinct. myrrh, tinct. opium, creosote, tannic acid, spirits camphor, hydronapthol, listerine, wine of opium, salicylic acid, and others. None of these should be used in a tooth root except as already advised. I have not mentioned iodoform. If it is an aqueous solution it is slightly a coagulant; but if it is a saturated solution in ether, it may be used, and I have used it in many cases with excellent results.

It is plain from what I have said, that I consider immediate root-filling contra-indicated in these cases. When the soreness has passed away the canal is to be cleansed thoroughly, dried, and filled. The method which I use is as follows: Red gutta-percha is dissolved in chloroform, and in it is placed a piece of waxed floss silk, which is then removed and allowed to harden somewhat by the evaporation of the chloroform. This gives you what is practically a cone of gutta-percha which has silk in it. The solution is pumped into the canal, and the gutta-percha and silk packed in till the cavity is filled. The object is that, despite the utmost care, pericementitis may recur in such a tooth, and renewed treatment becomes necessary. It is, as you all know, a difficult matter to remove a root-filling from such a tooth. With the filling here described there is no difficulty; because if one end of the silk is caught in the tweezers, the whole filling may be readily removed. At the same time, should such a removal be not indicated, the silk may be left in, because it is thoroughly imbedded in the gutta-percha, and cannot be compared with a cotton filling. This method is original with myself, but recently I have seen somewhere a similar suggestion, the gentleman using a twist of cotton, which is plainly not so good since the silk is stronger, more uniform in diameter, and may be prepared fine enough for very small canals. After a tooth of this kind has been

brought to a comfortable stage, it should be filled with gutta-percha or oxy-phosphate for several months, rather than risk renewed disturbance by malleting gold.

In cases where what is known as "blind abscess" occurs, the treatment is similar, especially where there is a pus discharge through the root. That is to say, coagulants must not be used, and immediate root-filling must not be resorted to, nor a permanent filling inserted, till after several weeks or months. If, however, the operator should decide from the exigencies of the case to drill through the gum and process, thus producing artificially a fistula, the procedure thereafter would be the same as in ordinary abscess which presents with fistula.

The third condition is that of alveolar abscess proper, and is to be divided into two classes, acute and chronic, each with a special treatment.

The acute abscess presents with a puff of the gum tissue, and we open it with a bistoury, releasing the pus and relieving the pain. A tampon dipped in oil of cloves should be left in the opening, and the patient dismissed till the following day, nothing being done to the tooth. On the second day the tampon must be removed the sac thoroughly cleansed of pus, and if possible the diseased tissue burred from the end of the root with an engine burr. The canal may be attended to at this sitting if the soreness has subsided; if not, it should be postponed till the following day. All remains of the pulp and septic matter should be removed from the tooth, as well as all decay. The canal should be freely opened and reamed out. In cases of abscess, whether acute or chronic, the reamer is specially indicated, because the walls of the canal are saturated with septic matter and frequently softened to a cheesy consistency. All of this softened dentine must be removed, even though the canal be enlarged beyond the necessity for filling. To those who are horrified at the bare suggestion of reaming a canal, I would like to say that a root of a tooth is the same and requires the same treatment whether it has lost the crown or not; and I would remind these gentlemen that where the crown had been lost they do not hesitate to enlarge the canal

for the reception of the post pin or screw used in fastening the crown into place. The root being thoroughly cleansed and all septic matter and softened dentine being removed, the procedure is different from that in either of the cases already described. In the first instance it was shown that the contents of the tubuli demanded our attention. They do also after abscess, though in a different way. It is needful that they be asepticized. Of course in all these operations it is understood that the rubber dam is in position, if at all practicable. The Evans root-dryer is to be used till there is a distinct feeling of heat on the part of the patient, and the hissing sound emitted from the contact of the heated point with the moisture present ceases entirely. As much moisture as possible being thus abstracted, one of the essential oils, let us say oil of cloves, is to be pumped in. The tooth thus dried out will absorb a great deal of the agent. This may be left for a minute or two, when the root is to be again dried out as before, and a second application of the oil made. This may be repeated three or four times, or until the operator feels assured that the agent has entered the tubuli thoroughly.

In these cases immediate root-filling is the only treatment which promises no return of the abscess. My practice is to pack at the extremity a small quantity of the canal paste recommended by Dr. Van Woert (oxide of zinc, iodol, and carbolized vaseline.) Right here it must be observed that, though this contains ingredients which are coagulants, they are not used in the tooth till the contents of the tubuli have been rendered aseptic. The main objection to coagulants is that, by coagulating the albumen in the contents of the tubuli at their ends, the openings are thus forever sealed against the entrance of antiseptics. Besides, combined in this paste they can be carried to the extremity of the root, which, remember, has been enlarged throughout its length without coming in more than temporary contact, if at all, with the sides. If coagulation occurs at the extremity, all the better, because the foramen is thus sealed up against the entrance of the dreaded bacteria. The canal is then sealed, as already described, with thin oxy-phosphate and a cone of gutta-percha.

In chronic abscess the procedure just described may be

essayed first and the root and tooth filled. Should the fistula reappear, thus proving that the abscess persists, it becomes necessary to either operate or abandon the case as incurable. If an operation is decided on, as it probably would be with any of the anterior teeth, the patient should be anæsthetized. Those who have had success with cocaine may use that uncertain drug. I have never been attracted by its effects; and I am informed by some eminent specialist on the eye that there is a feeling now prevailing that, though cocaine may effect anæsthesia during the operation, it is noticed that healing afterward is neither so rapid nor so satisfactory as where it is not used. In some cases gas will serve your purpose. But in a cuspid, or a two rooted bicuspid, ether is the only satisfactory anæsthetic, because of the time involved in the operation. The patient under its influence, a quarter or even a third of the root or roots are to be amputated and removed. This is done as follows: with a spear-shaped drill, drill through the centre of the root from the labial toward the palatal side. Follow with a new sharp fissure burr operating laterally both ways, thus severing the end of the root. This may be done with little injury to the gum, and is not at all difficult. To remove the root after it has been amputated is the part requiring the anæsthetic, for even a skilled operator may take an hour to accomplish it. Sometimes it may be pried out at the first attempt, but in extreme cases the alveolar plate must be removed before the root can be extracted. This may involve a large opening in the gum, but with proper care it will result in a perfect cure. The filling of the root where amputation has been decided on at the outset, occurs after amputation, and may best be done on the day after. The wound should be packed in the interim with cotton. When the patient presents, the end of the root will be in view. I ream through the canal till I see the reamer emerge at this point; I smear the canal with solution of gutta-percha, and fill with a cone, forcing it through the end. Then with a burnisher make this smooth by removing the excess.

As a dressing for these cases and any similar wounds where a loss of tissue is to be restored by granulation, I have had the utmost satisfaction from liquid vaseline, which I have

said contains benzoic acid, mixed with menthol, five per cent. This dressing will be found to be not only an antiseptic, but to a great extent sedative, leaving the patient in a most comfortable condition.

The fourth class of cases are those where crowns are to be used. Unfortunately these too seldom receive the treatment which would be accorded were the natural crowns in place. They are to be treated exactly as they would be if they were simply decayed teeth; and the crowning operation is to be decided on exactly as has been indicated for immediate root-filling. Wherever immediate root filling is indicated, the immediate setting of a crown after the other treatment has been attended to is permissible. Where immediate root-filling is contra-indicated, as in pericementitis and blind abscess, the crown should not be set until the tooth has been treated thoroughly, and then should be fastened with gutta-percha rather than with cement, just as a temporary filling was advised instead of a permanent one. To remove a crown set with gutta-percha, it is only necessary to heat the beaks of a pair of forceps, and hold the tooth till the heat has been transmitted, when the gutta-percha will become softened and the crown slip off easily.

In conclusion, I have to say that these directions, of course, do not apply to all cases; we can make no binding rules. In the matter of root-filling, a dentist must be a physician; he must recognize the pathological condition with which he is dealing, and be governed accordingly. His mechanical skill will be needed to perfectly carry out his method; but the most skilful mechanical dentist will not produce good results unaided by a knowledge of the symptoms of health and disease.

Again, I am aware that these methods cannot be applied in all teeth, even where they may be indicated. The buccal roots of superior molars and the anterior roots of lower molars often tax our utmost patience. The man who claims to thoroughly fill all such roots perverts the facts in the case, and imagines himself more skillful than it is possible for any man to be or to become. I have teeth in my possession which I will defy any man to fill from foramen to crown, with the whole operation in view, and appreciation of the conditions

more possible than it could be were such a tooth in the mouth. What shall we do in this case? Do our best, since no man may do more. But our best involves a great deal more work than many give to these cases. It is true that many roots cannot be filled, but it is also true that many roots are left empty because the operator was either unable or unwilling to fill them. A tooth with a pulpless, unfilled root is like an edifice with a defective foundation. Sooner than abandon such a root, I would cut away half the crown to gain access. It would be even better to cut the whole crown off and supply a substitute, if the root or roots could not otherwise be thoroughly filled.

Let us be thorough in all our work; but above all let us spare no pains to be thorough in filling roots.—*Dental Mirror.*

Communications.

AMERICAN DENTAL ASSOCIATION.

Editor of the American Journal of Dental Science:

The thirtieth annual session of the American Dental Association, will be held at Excelsior Springs, Missouri, commencing Tuesday, August 5th, 1890, at 10 o'clock, A. M.

GEO. H. FUSHING,
Recording Secretary.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS

Editor of the American Journal of Dental Science:

The next meeting of the National Association of Dental Examiners will be held in Excelsior Springs, Mo., Monday evening, August 4th, at eight o'clock, and at other times dur-

ing the week, between the sessions of the American Dental Association. It is important to have every State Board represented.

FRED. A. LEVY, D. D. S., Secretary.

Editorial, Etc.

ACROMEGALY.—At the Montefiore Home for Chronic Invalids in New York there is a patient suffering from a peculiar and incurable disease, the like of which is rarely met with, and never before in such a perfectly hopeless and completely developed state as in this instance. It is called acromegaly, but the name conveys no information of the horrible nature of the disease, which is one that baffles medical skill. The bones of the frame and cranium of a victim of acromegaly never cease to grow, but add bone tissue to bone tissue, cartilage to cartilage, until the individual is distended to an enormous size.

A Prussian woman, thirty-five years old, is afflicted with this disease and has been at the Montefiore Home for the past year. She was also at the German Hospital for fourteen months. The bones of both the frame and head have been steadily growing, the disease first developing when she was twenty-seven years old. No case of a similar nature, so complete in every detail, has before been met with by physicians either in this country or in Europe, though the disease has been observed before in a partly developed form. A case to which the public had their attention called was that of the "freak" at one time exhibited at the museums as the alleged big-footed girl.

The disease in its fully developed form is one that attacks the bones of the extremities first. The hands and feet begin to develope enormously. Then the extremities of each individual bone take on bone tissue and increase in size. At about the same time the bones of the cranium and the cartilages of the ears also develop. While this process of development in

bone tissue is continuing an atrophy of muscular tissue is going on and certain glands that remain almost rudimentary in the healthy adult are developed. The medical fraternity is at a loss to account for this curious phenomenon.

The poor victim at the Montefiore Home now weighs 191 pounds, which is almost entirely due to the bone tissue. Her hands, feet and head are enormous. Her face is pale and her features are distorted. She suffers little pain from the unnatural disorder. Strange to say that with the growth of her bones the joints remain free and active and are as flexible as ever.

BREATHING THROUGH THE MOUTH A CAUSE OF DECAY OF THE TEETH.—Dr. Scanes Spicer, of London, in a recent paper read before the Odontological society, remarked upon the frequency with which he had found carious teeth associated with obstruction of the pharynx and enlarged tonsils; so much so that he had made it a routine practice to examine the teeth in all cases of nasal obstruction, and he believed that there existed a relation between them; and he further is of opinion that there is a generic relation between some cases of vaulted arch, narrow jaws, and irregular teeth and nasal obstruction. Normally we should breathe through the nose, so as to warm and filter the air respired.

All animals, savage races and young infants do so; but a large number of adults of civilized nations breathe through the mouth, because they have some obstruction of the nasal passages, erectile tumors, permanent catarrhal affections, polypi, post-nasal adenoid growths, etc. Mouth breathing, he said, as a predisposing cause of caries of the teeth, came into action in various ways. The teeth were exposed to a current of air of a much lower temperature than that of the body, which would tend to cause inflammation of the periosteum and pulp of a tooth, the cold, dry air produced congestion of the mucous membrane, with a secretion of stringy acid mucus, and the rapid evaporation of water which takes place when the mouth is constantly open inspissated this mucus,

which so formed a fertile soil for the development of micro-organisms.

Again: When sleeping with the mouth open, the tongue falls back, and the parotid secretion finds its way directly through the pharynx instead of bathing and washing the teeth. With reference to the so called V-shaped maxilla, Dr. Spicer thought that many cases might be traced to mouth breathing, the muscles of the cheek pressing unduly upon the soft alveoli when the mouth is open.

Monthly Summary.

A CHESHIRE FARMER AND HIS FALSE TEETH.—A case was heard at Crewe County Court on April 9th, before his Honor Judge Hughes, in which the plaintiff was Charles Edwards, farmer, of Nantwich, who sought to recover £20 from Albert Maurice, dentist, of Liverpool, for the detention of a set of teeth. The plaintiff's evidence was that several years ago he bought a set of teeth for £15. The teeth were plated with gold and encased in vulcanite. A few months ago he went to the defendant and requested him to make some alterations in the upper case so as to make the teeth more comfortable. The alterations were made, and afterwards, at plaintiff's suggestion, the lower set was repaired. Subsequently, while sitting in the defendant's room, the plaintiff suddenly jumped up and demanded an explanation, stating that he had not received back his right set of teeth—that while his teeth were set in a gold plate and cost £15, the set produced were largely vulcanite, and there was not a pound's worth of gold on the case. There was a scene in the defendant's office, and because the plaintiff declined to leave the defendant walked out. The plaintiff's wife and daughter described the original set of teeth with the gold plate. The defendant said that the gold on the old case had been placed on the new, and while he could not swear it was the same piece of gold, he believed it was. A man named Rigby, who

modelled the case, said it was the same piece of gold, and that none of it had been taken away. The judge said that the action suggested a serious accusation against the defendant, for which there was no ground. He gave judgment for the defendant with costs.—*Dental Record.*

DENTISTRY IN 1892.—In looking over the *Phrenological Journal* for June, 1890, I came across a clever article entitled "Now and then," by L. A. R., giving one a peep into the life of a physician in the years 1822 and 1890. The writer, standing in front of a window in one of our uptown streets, in watching a physician's turnout which has just driven up,—a very stylish coupe, a fine pair of horses with gold-mounted harness, and all in charge of a driver in livery,—recalls to mind a little country town in the Connecticut valley where, during a visit a short while ago to one of the oldest houses in the village, while rumaging in long-neglected corners, found an old manuscript which seemed such a curiosity. It was a statement of account rendered by the village doctor to one of the first families (father, mother and four children), for medical attendance and medicines. An examination will show the difference between now and then. The amount for the first year, was 56 cents: 50 cents for emetic, and 6 cents for eye-water—not a very exorbitant price for medicines. The next year was but a single item—2 visits and 1 emetic, 50 cents. Think of a doctor only charging 25 cents for a visit!

The science of dentistry in those days had not so nearly reached the art of perfection as now, and the country doctor was expected to do all there was to be done in that line, which was confined to the removing of aching molars and an occasional cleaning of the teeth. The account for 1882 included a little in the art of dentistry, *i. e.*, extracting two teeth for Betsy, 17 cents. This looks almost as absurd as some of the prices we see in the stores nowadays. What sort of figure would gentlemen of the dental profession cut on those prices to-day?—*I. S. in Dental Mirror.*

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—OF—

DENTAL SCIENCE.

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ARTICLE I.

DENTAL EDUCATION.

BY C. STODDARD SMITH, D. D. S.

(Read before the Chicago Dental Club, March 24, 1890.)

Time was when the seeker after dental knowledge, upon the payment of lawful money of one hundred or two hundred dollars to a so-called preceptor, could be assured of a complete initiation into the mechanisms, mysteries, and secrets of the dental art in the space of a few short weeks, or months at furthest. Peeping through the crack of the laboratory door, he watched his preceptor as he mixed and inserted the "royal mineral succedaneum" (as the quacks of that day denominated amalgam), or "plugged" the carious molar with "gold leaf," introduced by smooth-bore instruments, or fixed the key on the dental organ which had ached. Secure in the private recesses of the laboratory, with doors closed so that the prying and non-paying world should not share in his good fortune, he became acquainted with the mysteries of wax impres-

sions, casts, dies, and soldering lamps. It was generally believed that the greatest effort and skill was required to master the secret processes of what is now somewhat pedantically denominated prothetic or prosthetic dentistry, while the art of saving the natural teeth was very easily acquired. To be sure, the student had to absorb and assimilate the fact that arsenic would "pizen" nerves; but contour fillings were an unknown quantity, and "gum-biles" were a pathological condition beyond the reach of the therapeutical knowledge of those by-gone days. A few plain excavators and pluggers, a key, a pair or two of clumsy forceps, a book of gold, and a pound or so of amalgam, with a scant outfit for making metal plates, and possibly a rolling-mill, comprised the stock in trade of the most progressive dentist. Yet I have seen gold plates made by a dentist of that period that for fit and workmanship would equal any, and far surpass nineteen-twentieths of the work of later years.

But that day has long since passed. Dentistry has outgrown and cast off its swaddling-clothes, passed through the period of adolescence, and emerged into the arena of a recognized profession.

Dental education in its modern phases is the subject we have before us for consideration this evening. What should it be, and how should it best be accomplished?

The dental student of to-day is easily resolvable, in origin, to one of two classes. The country youth, to whom a dollar resembles a cart-wheel in size, having discovered that he has just a little hole in one of his teeth, visits the villiage dentist, and is informed that there are a dozen cavities; and the amount of the bill, and the apparent ease with which the money is secured by the dentist, lead the patient to believe that a dental office is a "heap better than a farm," or "tending store," and is, in fact, a veritable bonanza, a soft snap, a philosopher's stone, or a Midas touch, which shall literally turn base metal to gold, and gold into greenbacks with about one thousand per

cent. profit. He casts longing eyes on the environment of the practitioner, wonders how long it would take him to "learn the trade," and soon determines to reach the wished-for goal, or die in the attempt. Another class is composed of the sons of well-to-do and ambitious parents, who, like the country youth, have been led to believe that the main work of the dentist is to take care of the money as it comes in; that the business is genteel as well as lucrative; and that it requires little time to learn it or capital to set up in it. The aspiring father sees in dentistry the short line to success, position, emolument, and most likely affluence for his offspring.

From both of these classes, as well as from other sources, come the rank and file of dental students to-day. But from whatever source they come, whatever motives actuate them, they one and all utter and re-utter the self-same query, "What is the least possible time and the smallest amount of money which it is necessary for me to devote before I can emerge a legitimate practitioner, and share in these golden rewards?"

Dental laws in nearly all the States have made it necessary that some sort of education shall be obtained; at least, that a diploma must be secured. These laws might with propriety have been entitled laws to promote the organization and operation of dental colleges. Certainly their effect has been to vastly multiply the number at least of these institutions. Armed with a diploma from one of them, the student possesses the "open sesame" to the mine of wealth he thinks he is about to put his pick into. He can defy examining boards, and by putting out his shingle with a D. D. S. attachment easily secure the prize.

Though the mallet has done much in private practice to bring the student from behind the laboratory door, and enable him to view the actual operation of filling, yet the patient objects to his presence as a rule, and the various pathological conditions, the proper formation of cavities, and many other matters are nearly as far from his reach

and observation as ever. Few patients will allow him to operate, even in the simplest cases. Further, few preceptors have the ability, the gift, or the time to teach the student, even had they the desire; and in many cases their main idea is to obtain as much in the way of service as is possible, with as little of effort on their part as may be. The dental college, properly officered, equipped, and conducted, changes all this. From the moment the student enters its doors he is in possession of facilities and advantages which years of private pupilage could never afford him. He has systematic and thorough instruction by didactic lectures; he has skilled instructors ever ready to encourage and aid his efforts, and to show him what to do and how to do it; he has patients awaiting his manipulations, who come with the expectation of such comparatively unskilled service. If studious, industrious, and energetic in using his opportunities, he can learn more in six months than he possibly could in two years under any preceptor, no matter how willing or competent to teach.

The dental college, then must be regarded as the chief educational agency of the dental profession. It must, of course, be supplemented by text-books, and if then is added the advantage of a private preceptorship, so much the better. When a man starts out in business of any kind, he naturally seeks to secure that which he must have as his stock in trade where he can obtain it to the best advantage. The dental student, whose dental knowledge is to be his stock in trade, is no exception, and, recognizing the soundness of the above conclusions, he seeks the dental college naturally and unavoidably. If we trace his career through these institutions, see what he actually does, or tries to do, what he accomplishes, and how he is equipped for his chosen profession when he emerges, we may, by comparing the actual process with an ideal one, be able to arrive at a conclusion as to whether dental education, as now conducted, is what it ought to be or what it might be.

All dental colleges of repute profess to require a preliminary examination in English branches. In other words, it is assumed that a man who is to occupy a professional position should be posessed of a common-school education at least, and have an intelligent knowledge of common branches. It ought, at least, to be understood that he will be required to show a decent knowledge of what the backwoods school-director termed "the three R's," to wit, " readin', 'ritin' and 'rithmetic," and it might not be too much to require a rudimentary knowledge of " spellin' " as well. But in how many colleges may we suppose this requirement to be anything more than a hollow mockery? Since this paper was begun the writer had it direct from a matriculate of a college which claims to stand high, that no examination whatever was required of him. It is probably the case, in at least a great many instances, that the process of matriculation consists of the transferring of a " V " from the pocket of the candidate to that of the dean, and the inscribing of the name of the applicant upon the roll of matriculates, unaccompanied by any such formalities as finding out whether the student knows anything whatever.

We will suppose that the student is " green," and enters at the fall term. He is at once plunged into an atmosphere entirely unknown to him. He hears terms of which he knows not the meaning, allusions and descriptions which he does not understand; he gets a dose of one or two subjects in the morning and of one or two more in the evening, with an intermediate admixture of practical operations of some sort. What wonder, then, if at the end of three months he becomes confused and bewildered? Education, in its literal and proper sense, means a drawing out,—an attempt to envolve or bring out the capacities of the individual. Dental education, as now conducted, seems to be largely a pouring in or a filling up process. It begins in this manner and it continues on this line to the end, and too often, we fear, the attempt is made to

pour in too fast, if not too much. The two terms of five or six month each is entirely too short a time to teach thoroughly all that is attempted in the curriculum of the principal dental colleges of to-day. It is not possible that the average student should in that brief time obtain more than the smattering of the many branches. It is well, therefore, and we regard it as a great step in advance, that this time is to be lengthened to three years, we mean thirty-six months of solar time, and not three years of five or six months each. That surely is none too long to gain even a superficial knowledge of all these subjects. All honor to those men who have worked to effect this end, whose efforts have at last set the date when this reform is to go into effect; and now let every individual member of the profession endorse and sustain it by refusing to receive any student who shall not pledge himself to spend this length of time; and let every State Board enforce it—as they have the power to do—by refusing to recognize any college as reputable which does not require it, or to admit to an examination any candidate who cannot show satisfactory proofs that he has studied for three years. Both of these things the Illinois State Board has done, but, so far as we know, no other Board has done so.

This is, however, a digression; we were discussing dental education as it is. The attempt to teach all branches during a six-months' term is a baneful effort to cram the student. The graded course, in which the studies of the first and second year are separated, is a great advantage, and should be generally adopted, as it is now by many or perhaps most of the better colleges. But, notwithstanding this, there is, we fear, a constant attempt to do too much. It is quite impossible to make a pint measure hold a quart. It is equally impossible to make complete anatomists and chemists and therapeutists and metallurgists and physiologists and microscopists out of average students,—that is, to make *all* of them thorough in *all* these branches. Yet each professor goes to work as if his object was to make

a specialist in his particular line. He seems to forget that he is but the part of a whole. Whether dentistry is a specialty of medicine or not, is a question foreign to this paper. The attempt to make it such by first demanding an M.D. degree has not been successful, and is not likely to be. Nor is the attempt to carry the instruction in purely medical and theoretical branches to an extreme, as it is my opinion is too often done, likely to be any more of a success. The student enters upon his second year face to face with the fact that he must master the remaining branches, or fail to secure his coveted prize. He *must* fit himself for the dreaded examinations. To this all his efforts are bent. He plunges into the vortex overwhelmed by misgivings, and it is then that the cramming process begins in earnest. As the time for the dread ordeal approaches, he is treated like the Christmas turkey, whose neck is stretched to stuff his crop with grain by the forcing process, rammed down with a ramrod, irrespective of the fact that the pabulum of the previous day or week lies undigested and unassimilated. He finds that he cannot possibly do all that is required of him. He *must* neglect something. He manages to get in the required fillings, and his practical artificial case, in some way, but that examination ever haunts him as a spectre. Unless he shall succeed in passing it, he cannot go forth with his degree. The result is that he emerges accredited to the world as skilled and competent, when really his practical knowledge is that of the merest tryro. He bears the insignia of competency, but really he is entirely unprepared to grapple with the actual demands of practice. He begins at once to learn at the expense of the unfortunate public who may fall into his hands what he should have been taught while in college. He has learned imperfectly, and in many cases very indifferently, how to master the ordinary office practice; how to make a gold filling, the *sine qua non* of successful practice; and as to the so-called prosthetic dentistry, he is in very many cases an utter failure, especially as to the de-

spised but much-called-for rubber plates. In extracting teeth he is probably a butcher. In the very essential matter of dealing with the public, of conducting a practice, he has most likely never had any instruction whatever. He has to pay well in time and money for teaching which he supposed was to make him a dentist, but the tendency of which has all the time been to make a specialist of him. In this attempt there is no probability of any considerable success. If a man is to be a chemist or a microscopist, he will find that what he learns in a dental college is merely rudimentary after all.

This tendency of the teaching of the day is not peculiar to dental education. It is found in our common schools and literary colleges as well. The pupil in our common schools is taught a little English, a little German, a little music, a little clay-modelling, a little of this, and a little of that, with the result that of any of these branches only the merest smattering is obtained; not enough to be of the least practical use in the business of life, and meantime the time which should have been spent in developing the powers and making progress in the common English branches is frittered away, and the pupil ends his school-days with no specialty at all mastered, and with a painfully imperfect knowledge of reading, spelling, grammar, arithmetic, and the common and practical things he will need to know and to use in order to fill his place in life. If he aspires to a higher education, he perhaps spends his time on Greek and Latin and Calculus, the result being that, although bearing the degree of A.M., he is forced to earn his living by some ordinary and perhaps subordinate occupation.

"For many a man comes home from school,
A Greek and Latin, Hebrew fool."

Let us not be misunderstood. We do not decry or belittle education. We respect and admire it. We wish to have every man who is attempting to get it get all that he possibly can, on all subjects. Let him imbibe from the

fountain of knowledge to his full capacity. But what we *are* contending for is that an education looking towards an object should be practical in its relation to that object. It is supposed that the object of dental education is to make *dentists*; not specialists of some sort or other. Therefore all his teaching should be mainly directed towards making a *dentist* of him. Let him learn as much more as his capacities, time, and opportunities will admit; but unless he succeeds in making a dentist of himself, his dental education must be a failure, no matter how much he may know of special branches. Much as we may magnify the profession of dentistry, the fact remains that nine-tenths of its practice is almost wholly mechanical. Anatomy and pathology and therapeutics, of course, are necessary branches; but dentists, as such, do not need to spend time on more than their main principles and the details which are connected with dental practice; when we come to simmer it down, the pathological conditions with which the dentist ordinarily has to deal are comparatively simple, and their treatment is equally so. The polychrests which he really needs in his materia medica are quite few in number, and all the multiplication of new remedies seems to amount practically to very little. If the specialists in dental therapeutics and materia medica will bring forth a certain and unobjectionable remedy for sensitive dentine, and inaugurate an era of really painless dentistry, they will accomplish more for the dentist and public than in fifty years of research to secure some new and original and probably expensive substance with which to do what has for decades been as well and successfully done with old and tried remedies as it can well be.

Then, again, microscopy is a very interesting and instructive science. It should be taught in every dental college. But can a dental student profitably spend days or weeks of the precious time of his course in making sections of liver and lung and vegetables? A dozen illustrated lectures (such as Dr. Sudduth can give) will teach him

more that he really needs to know, and in a more effective manner, very likely, than he could be taught by making sections without number.

Our main plea is, therefore, that dental education should consist more of practical teaching and practical work. More of this and *no less* of theory than heretofore, we would gladly say. But life is short, and so is the time alloted to preparing for the great work of life. The struggle for existence is ever present. Capacity, time, and means, all are often limited, and if the result is that one or the other must be sacrificed, let us cut off the theoretical and stick to the practical.

As it appears to us, one great defect of even the most pretentious of dental colleges is a lack of a proper number of chairs, and also of demonstrators. In one college which professes to have considerably over two hundred students there are fifty chairs, and hardly six demonstrators. If the two hundred students are studying dentistry, it is to be supposed that they should have the use of chairs. The proportion of chairs to students named give each student a chair once in three to four days, or an opportunity to perform thirty to thirty-five operations in a term. If some of them were juniors and not allowed to operate, the number might be increased to fifty or possibly sixty. But we submit that this is far too small a portion of the time to be devoted to practical operations. And as to demonstrators, it is perfectly plain to any one that knows anything about it that eight chairs are more than the average demonstrator can attend to properly. Yet it is believed that the facilities named are as good as any, and very likely exceptionally good. This is all wrong. If the college desires to do its duty by the student, it will provide such clinical facilities as will enable him to properly acquire the skill which he must have to sustain himself in practice.

But time would fail were we to enumerate the defects of the actual and the requirements of the ideal dental education. The subject is only outlined here.

In conclusion, let us utter one more word of caution lest the purport of this paper be misunderstood. It is the attainment of but few to become eminent in more than one department of life. To develop all that there is in a man, and direct it in one line of action, is all that can ordinarily be hoped for. Let those who control the educational institutions of the profession ever remember that their object should be to make *dentists*; to send out men competent in diagnosis, thorough and skilful in manipulation, kind and sympathetic in their bearing towards their patients, able to command the respect and confidence of the community. Let this be their object, and not the inculcation of some special fad; and let the student be made to feel that this is the case, and not that he is liable to be despoiled of his time and money and then either plucked and cast adrift because he fails to grasp some technicality, or else turned loose with a meagre equipment for the struggle which in most cases will confront him. He will then, if he has the right stuff in him, feel encouraged to put forth his best efforts, and be far more likely to succeed. Let the standard be never so high, but let it not be the case that the real and the practical is lost sight of in a fruitless effort to grasp the ideal.—*International Dental Journal.*

ARTICLE II.

CALCIFICATION.

BY SIDNEY SPOKES, M.R.C.S., L.D.S.

When the Dental Student has made himself acquainted with the arrangement of the soft tissues which constitute the formative organs of the future tooth, he has next to consider the process by which these soft structures become changed into the hard organs known as teeth.

In addition to other observations bearing upon this subject, a paper on the "Secretion of Lime by Animals" has recently appeared in the Report issued from the Laboratory of the Royal College of Physicians of Edinburgh. Mr. Invine and Dr. Sims Woodhead point out that the carbonate of lime present in sea-water is only one tenth of the whole lime salts present, whereas in the coral, shells and calcareous plants formed from the sea by animal and vegetable life the whole line is practically in the form of carbonate. On the other hand, sulphate of lime is largely present in sea-water, and these observers thought that this salt might be assimilated and then elaborated as carbonate. They experimented upon laying hens, the only lime supplied to the birds being the pure hydrated sulphate. It was calculated that during six weeks 954 grains of carbonate were elaborated in the form of egg-shell from the sulphate of lime supplied. On examining the oviduct it was found to be secreting lime, the epithelial cells containing lime in minute granules which, incorporated with the organic matter, appear to form the egg-shell. "It is interesting to note in this connection that the epithelial cells are evidently in a state of great functional activity, as a consequence of which the nucleus is considerably obscured, and that along with the lime there is secreted some other substance (probably the organic material in which the lime is eventually embedded.)" Having pointed out how the sulphate of lime may be changed into the carbonate these observers again refer to the special function of the epithelial cells in secreting the lime brought to them by the blood and lymph. "This lime evidently accumulates in the epithelial cells and is then thrown out on the free surface, just as urate, oxalates of lime, soda, &c., are secreted by the renal epithelium." As a result of the tissue waste by the activity of the cells, carbonic acid is present to combine with the lime secreted, and an analogy is drawn to what occurs in the formation of bone where, it is said, the organic basis is laid down by cells which, at the same time, actually secrete the

salts of lime derived from the blood and lymph. "The osteoblasts are the secreting cells." This statement may perplex some students who, perhaps, are taught that bone is formed by the ossification of the osteoblasts themselves; and perhaps some exception may be taken to the analogy being true. Another exception is pointed out by the authors—that in the formation of bone, where the amount of phosphoric acid salts in the blood and lymph is large and there is no special development of carbonic acid gas, the phosphates predominate. Whilst it is admitted that the above processes are "merely suggested," those interested in the subject will be glad to know that further investigations are promised; the great difficulty, it is said, being the ignorance at present existing as to the changes effected by protoplasm upon the constitution of inorganic salts. With regard to the conversion of lime salts, and secretion of carbonates, the authors say "that the process is the result of a combination of two forms of activity, the purely chemical and what we must call vital, must be taken for granted; and it is this vital part of the process which appears to eke out the possibilities of chemical reactions taking place." While it may be strictly true that secretion can only take place in a living medium, it may perhaps be asked whether it is possible to regard the conversion of soft organized material into a more or less hard mass as necessarily a vital process; for it has been done in the laboratory. Leaving on one side for the moment the consideration as to whether the cells concerned are themselves the receptacles for deposition of lime salts or whether they secrete something which afterwards becomes impregnated, the larger question presents itself—what is the relation, chemical or vital, between the inorganic salt and the organized material? In connection with this, every well regulated student bears in mind the names of Rainie, Ord, and Harting, and it may be useful to present, although in a necessarily condensed form, some account of their observations, if only to save reference to distinct papers.

Rainie, in 1858, published a book "On the mode of formation of Shells of Animals, of Bone, and of several other structures by a process of Molecular Coalescence, demonstrable by certain artificially formed products." Amongst other things he claimed to have discovered a process by which carbonate of lime can be made to assume a globular form, and he explained "molecular coalescence," the process by which that globular form is produced. He also came to the conclusion that the rounded forms of organized animal bodies depended upon physical and not on vital agencies. In a broad-mouthed bottle a solution of gum arabic saturated with carbonate of potash was allowed to stand until the carbonate of lime set free from the gum and the triple phosphate set free by the alkali were settled at the bottom. Two clean microscope glass slides, inclined against each other, were inserted, and the bottle filled up carefully with a filtered solution of gum arabic in common water. It was then covered up and kept perfectly still for three weeks or a month. The soluble salts of lime to be decomposed by the carbonate of potash are contained in the gum (in combination with the malic acid) and also in the common water; triple phosphate is also contained in the gum and set free by the alkali. The deposit formed upon the slides in the gum is of a globular form instead of the crystalline found in ordinary solutions.

Dr. Ord, 1870, found by experiment that where uric acid was deposited in the presence of albumen it took the form of either small crystals with rounded angles, or of dumb-bells, or of sub-spherical bodies or even spheres. Glass tubes with a plug of isinglass jelly at the lower end were placed in a weak solution of chloride of calcium and then filled up with a slightly alkaline solution of potassium oxalate. After three months the plug was opaque with earthy deposit and stratified, forming a layer of greatest density near the calcium solution. The forms varied on the oxalate side from those on the calcium, and a series of gradations led from one to the other; the coalescence forms

were chracteristic of the calcic end, the crystalline of the oxalic end of the plug. Very many other experiments were made. When gelatin was used and magnetized, the general result was an extraordinary increase in the size of all the forms, crystalline and non-crystalline, but no new forms nor a greater tendency to sphericity. The effects of light and heat were tried; no decisive results were gained in the former, but in the latter a kitchen specimen gave coalescence forms three or four times as numerous as the crystalline, whilst in a garden specimen this condition was more than reversed. Albumen was coagulated in tubes at a temperature not exceeding 200°, and oxalate of calcium deposited in these plugs at a temperature of form 50° to 60° took almost entirely the coalescence forms. Albumen was evidently much more active than gelatin in controlling crystallizing force. When phosphates and carbonate were arranged in proper proportions, it was found that the phosphate of lime was evenly distributed through the albumen in definite strata, not forming crystals or spheres, but cementing the albumen to great hardness, particularly at the line of greatest density. Carbonate of lime always formed spheres at the higher temperatures, but at lower temperatures showed attempts at crystallization by the formation of spines sticking out from the the spheres. In the bone-salts experiments the carbonate of lime was subdued, so to speak, by the phosphate, and an even sub-crystalline but continuous deposit was produced. The use of a phosphate as a cement and manipulator of the less tractable carbonate, is well indicated in these experiments; the strength of the carbonate seems necessary in all hard tissues that have to be tough. But the carbonate alone does not seem fitted to form tissue, tissue destined to be the seat of active interstitial change, therefore in the bird's high temperature and great vital activity we see associated a great predominance of phosphate. In the tortoise, with its low temperature and sluggish processes, a great decrease of phosphate and increase of carbonate; and in the shells of Invertebrata,

where interstitial change does not prevail, the carbonate alone or with but little phosphate suffices. In cases where this does not seem to hold good the explanation may be found in the nature of the animal matter with which the salts are associated.

Professor Harting published "Researches in Synthetical Morphology on the Artificial Production of Some Organic Calcareous Formations." He caused calcium carbonate and phosphate to combine, *in the nascent state*, with organic substances by using salts which by their double decomposition produce insoluble salts of calcium. After several weeks a considerable number of forms are developed which are mostly found in nature. The most frequently occurring form affected by calcium carbonate, in combination with albumen, gelatin, or the other organic substances used, he called *Calcospherites*. When these are formed in the midst of the liquid and the surrounding parts are perfectly tranquil, they are quite spherical; they become larger in proportion as their formation takes place with greater tranquility and slowness. They often contain a nucleus, and all those which attain a certain size are seen to be formed of concentric layers and very fine radiating fibres. Similar calcospherites, of spheroidal shape, are met with in nature in the form of different concretions in the bile, urine, and the saliva of certain animals; pearls are calcospherites, which in the course of time have attained remarkable dimensions. When the fluid is not kept quiet other forms occur, modifications of the calcospherite; one very remarkable is called *conostat*, characterized by a cup-shaped enlargement which becomes filled with air, and floats. The most remarkable of all the conditions, which assist in determining the shape of the calcospherites, consists in the fact of their mutual adhesion when they are developed in the neighborhood of one another. Calcospherites consist of a combination of calcium carbonate with organic matter, which is the sole residue when the calcareous salt is removed by treatment with an acid. If the de-

velopment has taken place in albumen, or a liquid containing albumen, the fundamental substance is no longer albumen. The albumen is transformed into a substance, the chemical relations of which are those of conchyoline, and resemble those of chitin. This Harting calls *calcoglobulin*. It is not necessary however to cause albumen to combine with calcium carbonate and then to decompose the resulting compound in order to obtain calcoglobulin. It can be obtained by placing a fragment of chloride of calcium in albumen. After some days the albumen dissolves the calcareous salt and is transformed into calcoglobulin, which presents also, in part, a fibrillar structure, and, having been washed, gives all the reactions of that substance.

If calcium phosphate is liberated by the double decomposition of calcium chloride and a neutral phosphate in albumen or gelatin no combination takes place. But if calcium carbonate is present there is a combination of the organic matter with the two calcareous salts.

From the above quotations it will be seen that it is not difficult for any student to make calcospherites for examination, and thus prepare the way for understanding better the relationship of the cell and the lime salt in the living body.

With regard to the question as to the conversion of the odontoblast in the formation of dentine, there is a passage in the paper communicated by Mr. C. S. Tomes to the Royal Society, "On the structure and development of Vascular Dentine," which seems to have escaped the text-books. In describing the capillaries clothed with odontoblasts, it is pointed out that when the latter calcify the capillary becomes solidly embedded in dentine. "And this is a strong argument in favor of what is known as the "conversion theory," of the development of dentine; supposing these odontoblasts to be calcified and themselves converted into dentine, there is no difficulty in seeing how the capillary comes to be enclosed in a tube of dentine, having the same calibre as itself. But if the odontoblast cells secrete

the dentine, as maintained by Hertz and others, how is the process to be completed when there is no longer room for an entire odontoblast or the half of an odontoblast between the rigid wall of already formed dentine and the capillary? One can hardly conceive a secreting cell going on shedding out from its end its secretion when it has been reduced to, say, one tenth of its length; and unless one is prepared to accept such a conception, this observation of the structure of a Hake's tooth-pulp becomes fatal to any "secretion" hypothesis of the formation of dentine."—*London Dental Record.*

ARTICLE III.

TIN AND GOLD IN COMBINATION FOR FILLING TEETH.

BY PROFESSOR W. D. MILLER, BERLIN.

Some men claim that tin and gold in combination is as good as tin, no better and no worse. Dr. Bonwill recently expressed himself on this subject, but his remarks show that he knows no more of the merits of this combination than those who know very little.

It is remarkable that so few men in America have taken a fancy to this method, when such men as Drs. Abbot of Berlin, and Jenkins of Dresden, after nearly a quarter of a century of experience, say that in many cases it is preferable to all other fillings. The trouble seems to have been that in America men have not known how to differentiate as to the best locations in which to use tin and gold.

The proper way to prepare these two metals for use as a filling is to lay a sheet of either number four, five, or six non-cohesive gold foil on a sheet of number four tin

foil, extra weight, and roll into ropes. In filling, work the material as one would non-cohesive gold. The manipulation is as easy, if not more so.

No special instruments are needed, though I devised a set which I believe are still kept in stock by the S. S. White Company. I depend chiefly on Nos. 1, 2, 5, 6, and 7 of this set. This, however, should be born in mind: that whatever the shape of the instrument, the point should be square, not round, because packing must be done sidewise.

The advantages which may be claimed for tin and gold are:

1. Exceeding softness and adaptability.

2. The ease and rapidity with which it may be manipulated, thus greatly simplifying the filling of large cavities for persons of extreme nervous temperament.

3. Indifference to moisture. It may sometimes occur that slight moisture may creep over the filling during the operation. This will not interfer with success and need give no uneasiness. I have made perfect fillings in mouths deluged with moisture where it has been impossible to dam up the saliva.

4. The consolidation of the material. An electrical decomposition, and then redisposition of the tin on the gold occurs, thus producing a solid mass.

5. This material invariably hugs the walls of the cavity and the margins.

6. It is a poor conductor of heat.

The disadvantage is that it assumes a color varying from a dull gray to black. It has neither therapeutic nor antiseptic action.

There are certain places where tin and gold seem specially indicated. These are: (1) Grinding surface cavities in lower molars; (2) molars only partly erupted, the use of the dam being impossible; (3) poorly developed six-year molars; (4) buccal cavities near or under the gum margin. (The cements or gold are practically worthless in these

cases); (5) small grinding cavities in temporary teeth; (6) teeth in which it is impossible or inadvisable to remove all the decay. Dip the first pieces in carbolic acid, and further decay will be prevented.

In many large cavities where it is desired that the surface of the filling shall be of gold, much time may be saved by filling with tin and gold about two thirds of the cavity, completing the filling with gold alone. In small, deep, or narrow cavities in grinding surfaces, or where the decay ramifies into the sulci, a better filling may be made beginning with tin and gold, and covering with gold, than could be made with gold alone. Much less of the tooth substance need be removed in such cases if the combination is used, owing to its softness and adaptability.

It sometimes occurs that there are overhanging edges of enamel which are strong and therefore should not be removed. This leaves deep undercuts difficult to fill properly with gold. Tin and gold should be used along the walls and under the overhanging enamel, and then gold wedged in the centre. There is no danger of such a wedge coming out, as it becomes a part of the whole mass under the electrical change already alluded to.

In crown cavities, where the pulp is nearly approached, tin and gold should be used on account of the low conductivity.

Tin and gold is of inestimable value in large distal proximate cavities. Such cavities, whether they open into the grinding surface or not, and especially in bicuspids, if filled with gold, will remain in good condition for three or four years at the outside. With tin and gold perfect fillings may be made, which will save the teeth indefinitely. Apply a matrix, place a piece of the rope against the buccal edge of the lower border of the cavity, and condense it. Follow with another piece against the lingual side, then a piece in the centre to wedge the others, then mallet. Continue in this way till the filling is well in sight, and complete the operation with gold. In upper incisors having

frail walls, cover the labial walls with non-cohesive gold and pack against it with the combination. Another valuable use for the material is where otherwise good gold fillings are leaking about the edges. They may be repaired with this combination, and will stand well.

DISCUSSION.

Dr. Stockton.—I have used tin and gold for a great many years. I began it perhaps as a matter of economy, using it in charity cases early in my career. I can show now some of those fillings twenty-five years old, still in good order. Dr. Miller alludes to one class of cases where he tells us that we can cut out as little as possible of the cavity. Cut out as much as possible, say I. Prepare all cavities so that you can see to the bottom. There are more failures from too little than from two much cutting of cavities. The trouble with too many of us is that we do not control our patients, but allow them to control us. Recently a lady came into my office, suffering from pericementitis caused by a dead pulp. I took up my engine and began to drill into the tooth. The patient cried out, "Stop, doctor; I will not allow you to cut away my tooth when there is no cavity." I laid down my instruments and said: "Go elsewhere, madam; I can do nothing for you. You have no confidence in me." In my office and in my practice I am master. That is as it should be. Then we can select our own materials for filling teeth, and cut away cavities or not as the need of each case indicates. Dr. Miller makes one mistake. He says that tin and gold has no therapeutic action. If it saves a tooth it has a therapeutic action. Anything which will stop decay in a tooth is therapeutic.

Dr. Gordon White.—I have had made for me some copper foil, which I am using under gold fillings as Dr. Miller uses tin. Thus far I am much pleased with the result.

Dr. Barton.—I do not believe that tin and gold will unite as is claimed. I have removed fillings in which no such union has taken place. I have such a filling in my

mouth and no union has occurred. Dr. Stockton is right: anything is therapeutic which protects the tooth. I think tin and gold no better than soft gold, though easier to work.

Dr. R. C. Young.—It is a well known law of electrolysis, that at the positive poles the hydrates of metals are deposited and at the negative gases are liberated, and thus metals are polarized. In this combination under discussion the tin is positive to the gold; therefore we have the salt of tin deposited, which may be absorbed between the dentinal tubuli.

Heat is transmitted by induction. This accounts for the low conductivity of the tin and gold filling. The heat passing through the gold meets the tin, which proves an obstacle. Much has been said and written about the disintegration of the cervical edges under fillings of gold. In those cases the dentine is negative to the gold; therefore a hydrogen gas is liberated at that point. Hydrogen is the active principle of all acids which destroy dentine. This is prevented when we use tin and gold, because of the salt which is deposited.

Dr. Patrick, of Belleville.—I have the profoundest respect for Professor Miller. If I had not known that he wrote this paper I should never have suspected it. It is the worst paper I ever heard from him. I used tin and gold for forty years. Then I grew wise, and I have not used it for twenty. I used it from a motive of economy.—*Dental Mirror.*

ARTICLE IV.

TANNIC ACID: ITS INTERNAL ADMINISTRATION FOR HEMORRHAGE AFTER TOOTH EXTRACTION.

BY DR. W. L. ROBERTS, WEYMOUTH, MASS.

Read before the Union Meeting, Springfield, Mass., October 25, 1889.

Tannic acid, as we all know, has a yellowish-white color and strongly astringent taste. It is decomposed and entirely dissipated when thrown on red-hot iron. It is very soluble in water and less so in alcohol and ether. Its solution reddens litmus and produces with solution of gelatine a white flocculent precipitate, and with solution of the alkaloids white precipitates, and is very soluable in acetic acid. Dose from three to ten grains.

Very little has ever been written, and less said, upon the internal administration of this most valuable adjunct to our list of hæmostatics.

The most of us do at times have those perplexing cases of hemorrhage from extraction which are very hard to control, and necessarily resort to numerous devices to bring about the desired results, all or a portion of which are very disagreeable to both dentist and patient.

Tannic acid, administered internally in proper doses, will stop, I believe, any case of hemorrhage caused by tooth extraction, in from thirty minutes' to one and one-half hours' time. The manner and results of administering this very simple remedy I will illustrate by one case in practice.

I was called, March 25 1885 at 8 P. M., to check hemorrhage from the lower gum of a lady, caused by the removal of eight badly-decayed and broken-down teeth. They were removed while patient was under nitrous oxide gas, with no more laceration of the gums than generally

occurs. Patient did not bleed very profusely at the time but as she was a hemorrhagic diathesis I kept her there until it had entirely ceased, with instructions to call me at once if there was a return of the hemorrhage to any great extent. As she lived some distance away, and being at home alone, I did not hear from her until about 7 P. M., when her husband came to me with the information that his wife was bleeding to death. I immediately went to their residence and found the patient in a bad state indeed. Pulse was very weak, and she looked about ready to expire, but there was life, and, upon inquiry, I found that she had expectorated nearly one quart of blood. Upon examination I found blood oozing from all portions of the gum. I immediately placed three grains of tannic acid in one third glass of water and gave her two teaspoonfuls every five minutes until she had taken three doses, then two teaspoonfuls every fifteen minutes; after the second dose the flow had diminished to such an extent that I left them with instructions to administer the same amount every half-hour which they did, and were only obliged to give two doses before it ceased entirely, with no return.

I have used tannic acid for the last five years, whenever occasion presented, with the same good results, in fact it has never failed me.

Now, what is its physiological action. From experiments on animals with very large doses, it appears that this acid renders the gastric mucous membrane pale and lustreless and coagulates its mucous. Injected into the blood-vessels it coagulates the albumen of the blood. To the former of these actions, as well as to its inherent astringency, must be attributed the dryness and sense of constriction which it produces in the mouth and fauces.

We are told that tannic acid is not absorbed and does not circulate as such, but is converted into gallic acid. It is true that in this form alone it is found in the blood and urine. Indeed, it could not remain in the blood without coagulating it, as experiments on rabbits demonstrate; but as gallic acid is

not an astringent, it is difficult, while admitting the conversion of the one acid into the other, to explain the therapeutic operation of the latter.

Several theories have been proposed for this purpose, but, as far as I can find, all of them are unsatisfactory.

Lewin has shown that the coagula of albuminous substances formed by tannic acid, if made slightly neutral, loses its coagulating power. Thus an albuminate of tannin formed in the blood is dissolved again in an excess of that alkaline liquid. A small portion of tannin escapes neutralization and is discharged with the urine unchanged, and hence, according to Lewin, tannin, as such, may exert its power in all parts of the system. It would appear, also, that the hæmostatic and analogous qualities of tannic acid are due not to an action upon the blood, but upon the blood-vessels, by which they become contracted and the flow of blood through them is checked.

We also see in nervous patients frequent anomalies of the vaso-motor and trophic functions, but up to the present time we know comparatively little that is certain to the precise nature of their occurrence.

Physiology distinguishes two varieties of vaso motor nerves,—tbe vaso-constrictors and the vaso-dilators; but since experiments have detected the latter variety in only a few places, for example, in the chorda tympani, the nervi erigentes, and the sciatic, they have not acquired a very great significance in human pathology. We are at present much more disposed to refer every abnormal constriction of the vessels to an irritation and every abnormal dilatation of the vessels to a paralysis, of the vaso-constrictor nerves, although perhaps pathological conditions of irritation of the vaso-dilators may not be at all rare. In regard to the anatomical course of the vaso-motor nerves, it is necessary to state that vaso-motor irritations may certainly proceed from the cerebrum, as is shown by the well known symptoms of blushing and pallor from mental emotions. In experiments on dogs Eulenburg and Landois have succeeded in producing a fall of temperature on the opposite side by irritating certain portions of the cortex in the immediate vicinity of the motor centres, and by extirpation of the same parts they have produced a rise in

temperature. It is now known with certainty that there is an important vaso-motor centre in the medulla oblongata, the irritation of which, directly or reflexly, is followed by an almost universal vascular constriction, and its destruction by an almost universal vascular dilatation. We must probably seek the further course of the vaso-motor nerves largely in the lateral columns, from which they pass out chiefly by the anterior roots; but there are also experimental data suggesting the presence of vaso-motor nerves in the posterior roots. It is not known with certainty whether there is any decussation of the vaso-motor fibres, or, if there is, where it occurs. The larger part of the vaso-motor nerves collect, at any rate, in the principal trunks of the sympathetic, from which, as is well known, the separate plexuses that surround the vessels arise. It is probable, however, that there is in part a direct passage of vaso-motor fibres from the cord into the peripheral nerves. There are also ganglia in the walls of the blood-vessels themselves that are capable of maintaining the tone of the circulation in the absence of the central force or influence, but under ordinary conditions these minor ganglia are denominated and controlled by the one central power which unifies the whole system and renders it complete.

But, be it as it may, tannic acid, administered internally in proper doses, does stop the flow of blood from ruptured blood vessels, and is a hæmostatic that I wish to commend to the careful consideration of all, for by looking deeper into this subject we shall all be benefited and perhaps add one more drug to our list.

Perhaps this paper does not present many new points or ideas to the older members especially, but my object is to revive, create, or bring to the front more modern ideas than our present materia medica furnishes. Our chosen profession is on the steady march upward in nearly all its branches, and may I not be pardoned if I ask, have we not neglected our pharmacopœa and turned our attention too much to the modern bridge-work or the Herbst method of tooth-filling? Is there any one department in dentistry that is so much neglected and yet be so thoroughly understood? Are we not falling behind just a little in this branch? Is there not a splendid opportunity for some of our eminent men to furnish us with an improved, concise, and modern materia medica?—*International Dental Journal.*

ARTICLE V.

THE FIRST PERMANENT MOLAR.

BY J. F. COLYER, M.R.C.S., L.R.C.P., L.D.S.

Probably no tooth in the whole dental arch has given rise to more discussion as to its treatment than that of the first permanent molar, and in the following remarks no new idea has been advanced, but the question of treatment has been briefly reviewed. The six-year old molar is of special interest to us from more than one point of view.

Physiologically it is the most useful tooth in the whole arch, since it presents the largest area of crown surface, is situate in a position where mastication is greatest, and is admirably adapted to bear the strain thus put upon it, inserted as it is into the molar process, the thickest portion of the maxillary bone.

Pathologically, the first permanent molar is of interest, since it is more liable to caries than any other tooth, caused probably by its structure being weakened in its development at a period when nutrition in the child is often at fault.

The six-year olds are also of great importance in preserving the integrity of the arch, since should they be lost prior to the eruption of the second permanent molars, irregularity may frequently be caused in the other teeth; or if later than this period, the second bicuspid and second molar will constantly tilt towards each other, and thus lose their use in mastication to some extent, or cause disarrangement of the bite.

From these facts it is evident that our decisions on a course of treatment in these cases will at times be a matter of the utmost difficulty.

In the six-year old then, we have these two great characteristics, the one militating against the other, *idem est*:—

its physiological utility in mastication and its pathological tendency to decay. Presuming these to be set off against each other, our treatment will almost invariably turn upon the question of irregularity.

Probably the best method of treating the subject will be to assume the various cases that most frequently come before our notice and discuss them separately.

(i.) *Given an overcrowded mouth and moderately sound six-year olds.*—There can be no question of our treatment in these cases, the bicuspids should be removed, and the molar, a tooth of far greater importance in mastication, should be saved. The same treatment will apply when a slight cavity may exist in the six-year old molars.

Some practitioners always make it a rule to remove the six-year olds rather than the bicuspids on account of the greater liability to decay in the former. We would ask them to remember that the molar has withstood the secretions of the mouth for a much longer period than the bicuspid, and hence there is no reason why it should be a weaker tooth. We may even lay it down as a rule, that a six-year old molar remaining healthy until the age of twelve is far less prone to approximal decay than the bicuspid.

(ii.) *Given an overcrowded mouth and carious six-year olds.*—There can be no doubt that in these cases we should adopt radical treatment and not only should we extract such molars as are carious but we strenuously advise the removal of all four six-year olds. Nature will usually speedily overcome any crowding, and the gaps left will be gradually filled by the twelve-year old molars and second bicuspids. The travelling backwards of the bicuspids is brought about in the following manner: each aspect of the crown surface of these teeth presents practically an inclined plane. Now these antagonistic planes will naturally act upon one another in the direction of least resistance, and should the four six-year olds have been extracted as suggested, we get the bicuspids moving backwards to at least partially occupy the spaces left.

Should only one first permanent molar be extracted, the opposing teeth in the other jaw will be locked, we shall fail to get any natural backward action, and shall have to resort to artificial means in order to pull back the bicuspids. I need scarcely mention here that mechanical contrivances should always be avoided if possible. Again, should only one six-year old be extracted, the corresponding tooth in the other jaw is to all intents and purposes useless in mastication.

Hence with an overcrowded mouth and carious six-year olds, we strongly advise the extraction of all four.

(iii.) *Given a case with practically no overcrowding and carious six-year olds.*—The amount of decay that has taken place, and the number of six-year olds attacked by caries, must be taken into account. It is very unusual to find one of the six-year olds carious and the other three sound, but should this be the case we should be inclined to adopt conservative treatment and endeavor to save the tooth.

Now since six-year olds are so pathologically liable to decay, we shall find it at all times an exceedingly difficult matter to put a permanent filling into these teeth. We should bear this fact prominently in mind when considering our treatment. Should our filling fail shortly after insertion, we shall be worse off than ever.

Hence we should undoubetdly advise extraction of all four six-year olds should approximal decay have attacked them, and should we not feel absolutely certain of introducing a permanent filling.

As a rule the wisdom teeth, from the fact that they are placed so far back in the dental arch, are of practically little or no use in mastication. Should, however, the treatment of extraction have been adopted, they will come forward together with the second molars and take up to a large extent their normal functional use in the trituration of food. In no case, however, will they be as serviceable as the six-year olds, should the latter have been preserved.

We have yet to briefly discuss our general treatment

of the six-year old and the time at which it should be extracted, presuming this course of treatment has been chosen.

Only in exceptional circumstances should we extract the first permanent molars before our patient is from eleven and a-half to twelve years old, and should they be carious, we must patch them up or treat them in the ordinary way in order that they may last until the age specified. For stopping purposes, Tullivan's amalgam certainly stands *facile princeps*, as it appears to exert a hardening influence in the dentine. Should the pulp have to be drilled, great care must be taken with our drills, as the apical foramina are necessarily large.

Presuming then our patient has arrived at the age of twelve, the question arises, should we extract the six-year olds just as the second permanent molars are appearing through the gum, or should we wait until the latter are fully erupted? I think the time should depend on circumstances. Should our extraction be performed on account of the unhealthiness of the six-year olds, it should be proceeded with just before the eruption of the second molars, so that the latter may come well forward. Should there be much irregularity, however, and a good space is required, we must defer our operation until the second molars are fully erupted.—*The Dental Record.*

ARTICLE VI.

IMMEDIATE ROOT FILLINGS.

BY DR. M. S. MERCHANT, of GIDDINGS, TEXAS.

Read before the Texas Dental Association, at Belton, Texas, May 6, 1890.

It is with some degree of trepidation that I mention my subject, which is "Immediate Root Filling." This operation has been written and talked about so much that we

are all tired of it. Still the fact that roots of teeth must be filled, is forced upon us every day; therefore it behooves us to learn how best to do it. To begin: A patient comes to you with an upper central incisor, with large cavity approximating the other central. The tooth is badly discolored, and upon examination you find the pulp is dead and giving off a very offensive odor. You wish to restore the organ to its former beauty and usefulness as nearly as possible. What will do it and how shall it be accomplished? I will give you my method: First, with chisels, excavators and engine burs I remove all decayed dentine and friable enamel, and make a good clear opening into the nerve chamber and canal; then if necessary, with Gates' Glidden drills, open the canal until I can introduce Donaldson's canal cleansers and clean out all the debris; then with small syringe with gold point, I throw hydrogen peroxide into the canal and keep it up until it ceases to foam, when I put on the dam and with Japanese bib. Paper cones made by rolling small bits between the thumb and finger, dry out the canal as well as possible, after which I dip a small bit of the paper into alcohol and force into the canal to assist in extracting the water from the dental tubuli, and dry out as before. Now the hot air syringe is brought into service, and heated air is pumped into the canal; then heat a wire to redness and pass into the canal repeatedly, if necessary, until it is thoroughly dried out. Now with whalebone point, force a solution of gutta percha in chloroform into the canal. Give the chloroform a little time to evaporate; then force a gutta percha cone into the root very firmly and you have almost a perfect if not a perfect root filling. I do not hesitate to do this if there is an abscess, knowing that I have removed the cause, i. e., the dead pulp. And in addition to this have sealed permanently the fountain from whence the poison came that caused it, viz.: the foramen at the apex of the root. The only disinfectant and antiseptic that I have used having been hydrogen peroxide, it having broken up

the pus and killed the bugs (if there be any bugs) and made the canal as nearly antiseptic as anything known to me can do it. The abscess will then get well of itself. I of course prefer having a fistulous opening to an abscess, but proceed just the same if there is not; and out of more than one hundred cases I have had to drill through only one process to relieve the pain, and this gave almost immediate relief. In this case the abscess was throbbing and hurting at the time I was filling the root.

Peroxide of hydrogen is a colorless fluid and in decomposing it is said to give off four hundred and seventy-five times its volume of oxygen. When it comes in contact with pus in an abscess it breaks it up and when it has an opening forces it out mechanically. I have used it in a case of abscess of antrum, in which case I was assisted by Dr. L. C. Johnson, the patient's family physician. It was a case of long standing. All the teeth on the right side above were decayed and broken off to the gum. All of them were badly abscessed and the antrum had became involved, the palatine bone on the right side had become soft and there was a large fistulous opening at palatine suture and another opposite first bicuspid. I extracted the teeth and we washed out the antrum twice a week for a short time, the openings healed up, the bones hardened; and in a few months I made her a plate which she is still wearing and she has a healthy mouth. Dr. Friedricks, of New Orleans; when at Galveston last year said dentists are coming here to the Southern Dental Association and making assertions that they are doing "this and that," but he wanted data. It struck me forcibly enough to cause me when I got home to get me some books to keep a record of my work in, and bring with me my book of root filling giving only a record of what I have done since that time, and anyone who wishes to do so may look over it, and see the names of the parties, and where they live, etc. I see some of them every day, and all of them are in easy reach at any time. Now I have not tried to bring up anything new or

that is unknown to any well informed dentist, but there are some of you who are sceptical on the subject of immediate root filling, and the sceptic as a rule is the man who has not given it a fair trial. I only ask you to give it a test trial before you condemn it, and in trying it be thorough or you will make a failure. If you operate thoroughly and intelligently, my word for it you will be successful in saving the tooth, and at the same time save your patient the money and trouble of repeated visits to the dentist.—*Texas Dental Journal.*

ARTICLE VII.

HYPNOTISM IN DENTISTRY.

DR. HUGENSCHMIDT, of Paris, writing in the *Dental Review* says;—It is a well recognized fact, by all those who have carefully studied the subject of hypnotism, that certain persons can hypnotize *themselves*, without the aid or presence of a second person.

The hypnotic state being obtained, insensibility of a certain part of the body can be easily produced, just by the verbal statement of the operator who simply says: "This or that part has become insensible to pain." At this moment the operation can be performed painlessly.

In certain cases the patient, as soon as hypnotized, is in a general anæsthetic condition.

I have now studied this method for over seven years in general medical practice, but have only once employed it in dentistry, this being in a general hospital. I object to using this method in our office, on account of the general superstition still attached to this subject of hypnotism or magnetism by a majority of patients, who believe that one who occupies himself with hypnotism is endowed with a "supernatural power," rendering him capable of doing any

thing with a patient who places herself or himself into his hands. It is needless to say that this is an erroneous idea; yet as in our specialty, we are most of the time alone in our office with a patient, I have preferred to keep on the safe side, and, to prevent any disagreeable allusion, I have always positively refused to employ hypnotic sleep in our office for a dental operation, although I am absolutely convinced that this method would be of the greatest value in our specialty, especially in painful or very long operations.

M. Godon, in a communication read before the Odontological Society of Paris, in May, 1888, (*Odontologie*, July 1888), speaks on the use of hypnotism in dental surgery, mentioning the fact that this method was then being used at the Paris Dental School for the painless extraction of teeth. M. Godon also reported a case in which he used, on several occasions, mental suggestion on the same person for the purpose of excavating sensitive dentine on a highly nervous patient with complete success.

The only time I used this method in our specialty, as stated above, was in a military hospital of Paris, in 1882, on a soldier who was suffering severely from an exposed pulp in a superior bicuspid.

Before hypnotizing the patient I slightly touched the pulp with a needle. The way the patient expressed his delight in regard to my proceeding proved to me that the pulp was by far not a dead one. The man was then hypnotized. When he was placed in that condition I was able to touch the pulp, to pinch it, to tear it. I introduced a needle in the middle of its substance; it bled, but not the slightest indication of sensation could be denoted on the patient's countenance. He was then again restored to consciousness—to his normal state—and the needle was again introduced into the pulp canal. A formidable cry, accompanied by a good, solid profane word, was highly expressive of the variation of sensibility of our patient's pulp.—*The Dental Record.*

Communications.

MISSOURI STATE DENTAL ASSOCIATION.

ST. LOUIS, MO., July 29, 1890.

Editor of the American Journal of Dental Science:

Twenty-sixth annual meeting held at Pertle Springs, Warrensburg, Mo., July 8, 9, 10, 11, 1890. President Dr. Henry Fisher called the meeting to order.

The committee on resolutions to the memory of Dr. A. Noland, presented the following, which were adopted by the Association:

To the Members of the Missouri State Dental Association:

Whereas, Death has removed from our ranks our beloved brother and co-laborer, Dr. A. Noland, of Monroe City, on the 22nd of January, 1890; and

Whereas, Dr. Noland was a faithful student, an honored laborer and worked hard to raise the standard of our profession in this State;

Therefore, Resolved, That this association mourn with sorrow the loss sustained.

Resolved, That this association hereby tender his bereaved family its heartfelt sympathies and condolence in this their sad bereavement, and may that God, in whom he so implicitly trusted, speak peace to their sad hearts in their distress.

Resolved, That a copy of these resolutions be sent to the family of our deceased brother and to the dental journals for publication.

B. Q. STEVENS,
G. M. RISLEY,
JAS. L. LEAVEL,
Committee.

The committee to draft resolutions on the death of Dr Judd presented the following, which were adopted :

Whereas, The recent death of Dr. Homer Judd brings to mind his activity and influence in the organization of this association, and his subsequent labor in extending its usefulness, to the great benefit of the profession in this State; and,

Whereas, His noble character, energy and his literary attainments entitle him to an exalted place on the scroll of deceased members; therefore,

Resolved, That in the death of Dr. Judd this Association has lost an honored member, whose professional character and example we emulate, and whose memory we ever hold dear.

Resolved, That the heartfelt sympathy and condolence of this Association is tendered the family of our departed brother in their sad bereavement.

Resolved, That a copy of these resolutions be sent to the family and to the dental journals for publication.

W. H. EAMES,
C. W. SPALDING,
J. C. GOODRICH,

Pertle Springs, July 9, 1890. *Committe.*

Drs. Price, T. W. Reed, and F. Swap were appointed a committee to draft suitable farewell resolutions to Dr. Spalding, and reported as follows:

Mr. President and Members of the Missouri State Dental Association,

Gentlemen:—We, your committee appointed to draft resolutions expressive of the pleasure of this Association, afforded by the presence of Dr. C. W. Spalding, and of regret that he will soon sever his social connections with us, most respectfully submit the following resolutions:

Resolved, That with a full appreciation of Dr. Spalding's virtues as a gentleman, his high moral character as a man, his eminent qualifications and invaluable counsel as a

professional brother, we tender to him our most sincere thanks for his presence at this meeting (probably the last time we shall meet him on this earth); we deeply regret that he should feel it necessary to sever his social connection with us.

Resolved, That we fully realize the fact that no one has done more than he to advance the standard of our profession and the best interests of this Association, which will ever, by us, be remembered and cherished with grateful hearts.

Resolved, That in his departure, he takes with him our most earnest wishes for his success, prosperity and happiness; and may kind Providence ever watch over, guide and shield him.

Resolved; That these resolutions be spread upon the records of this Association, a copy, properly engrossed, be presented to Dr. Spalding, and one sent to each of the dental journals for publication.

JAS. A. PRICE,
T. W. REED,
F. SWAP,
Committee.

The election of officers resulted as follows: President, Dr. J. F. McWilliams, Mexico; Vice-President, Dr. Geo. L. Shephard, Sedalia; Second Vice-President, Dr. W. H. Buckley, Liberty; Recording Secretary, Dr. John G. Harper; Corresponding Secretary, Dr. William Conrad; Treasurer, Dr. James A. Price, Weston; Board of Censors —Drs. J. G. Hollingworth, W. L. Reed, Chas. L. Hungerford; Committee on Ethics—Drs. N. H. Gaines, C. V. Huff, J. W. Aikin; Publication Committee—Drs. E. E. Shattuck, H. S. Lowry, W. E. Tucker; Law—Jas. A. Price, Weston; Committee on New Appliances—Dr. J. M. Austin, St. Joseph.

EXECUTIVE COMMITTEE.—Dr. William Conrad, Dr. Henry Fisher and Dr. J. W. Whipple, St. Louis.

SUPERVISOR OF CLINICS.—Dr. A. J. Prosser, St. Louis.

Next place of meeting, Louisiana, Mo., 1st Tuesday after July 4th 1891.

WM. CONRAD,
Cor. Sec'y.

321 N. Grand Ave.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

EXCELSIOR SPRINGS, Mo., Aug., 1890.

Editor of the American Journal of Dental Science:

The ninth annual meeting of the National Association of Dental Examiners, was held at Excelsior Springs, Mo., commencing Monday, August 4, 1890.

The following State boards were represented:

Colorado, Dr. P. T. Smith.

Illinois, Dr. C. R. E. Koch.

Iowa, Drs. S. A. Garber, E. E. Hughes, and E. D. Brower.

Pennsylvania, Dr. Louis Jack.

Maryland, Dr. T. S. Waters.

Kansas, Drs. L. C. Wasson and A. M. Callaham.

Ohio, Drs. J. Taft and H. A. Smith.

Minnesota, Dr. J. H. Martidale.

During the sessions the Board of Registration in Dentistry for the State of Rhode Island and Providence Plantations, represented by Dr. Wm. P. Church, was elected to membership.

In the absence of the secretary, Dr. F. A. Levy, Dr. J. H. Martindale, of Minnesota, was elected secretary *pro tem.*

After discussion, the following resolution, offered by Dr. Jack and amended by Dr. Koch, was adopted, on motion of Dr. Taft:

Resolved, That this body recommends the various examining boards under no circumstances to grant temporary licenses to dental students at any period of their course of instruction, whenever their State laws will permit them so to do.

Drs. Jack, Garber and P. T. Smith were appointed a committee to formulate the principles which this association would recommend should be incorporated in the State laws. This committee subsequently presented a report which, as amended and adopted, recommended the following principles for incorporation in the laws for the regulation of dental practice or for the guidance of those framing them:

1. The creation of boards of examiners in each State.

2. The boards to be officially created by the constituted appointing power of the various State, the appointees to be selected from a number of names presented by the representative State societies; each State society at its annual meeting placing in nomination not more than two names for each appointment to be made.

3. Recognizing five years' actual practice at the time of the passage of the law as qualifying for the continuance of practice.

4. Empowering the examining boards to examine and grant certificates to non-graduates, provided the candidates present satisfactory evidence of having had at least five calendar years of instruction.

5. These and all other examinations to be both oral and written, and candidates to be also subjected to tests of practical skill.

6. Empowering the boards to examine graduates in dentistry.

7. Prohibiting medical graduates without special qualifications practicing dentistry.

8. Requiring medical graduates to have their special qualifications determined by the same tests as other non-graduates in dentistry (see No. 5).

9. Making failure to pass the required examination in any one branch sufficient cause for refusal to grant the certificate.

10. Making failure in the practical tests in either of the two general departments of dentistry work disqualification.

11. Expressing the opinion that examinations for the special degree in dentistry should be conducted by a board of examiners established by law in each State, instead of by faculties as at present; and the belief that the power to grant degrees must at length become vested in boards created for the purpose.

12. Conferring on State boards the power to revoke, for cause, a certificate of qualification previously granted.

The secretary was directed to call the attention of the American Dental Association to the fact that a case involving the constitutionality of the law regulating the practice of dentistry in New Hampshire is now pending in the Supreme Court of the United States, and asking them to see to it that it does not go by default.

Dr. Koch, from the committee on dental colleges, reported the following schools the diplomas of which this association recommends that the State boards indorse:

American College of Dental Surgery, Chicago, Ill.

Baltimore College of Dental Surgery, Baltimore, Md.

Boston Dental College, Boston, Mass.

Chicago College of Dental Surgery, Chicago, Ill.

College of Dentistry, Department of Medicine, University of Minnesota, Minneapolis, Minn.

Dental Department, Columbian University, Washington, D. C.

Dental Department of Northwestern University, Chicago, Ill. (Now University Dental College.)

Dental Department of Southern Medical College, Atlanta, Ga.

Dental Department, University of Tennessee, Nashville, Tenn.

Harvard University, Dental Department, Cambridge, Mass.

Indiana Dental College, Indianapolis Ind.

Kansas City Dental College, Kansas City, Mo.

Louisville College of Dentistry, Louisville, Ky.

Minnesota Hospital College, Dental Department, Minneapolis, Minn. (Defunct.)

Missouri Dental College, St. Louis, Mo.

New York College of Dentistry, New York, N. Y.

Ohio College of Dental Surgery, Cincinnati, O.

Pennsylvania College of Dental Surgery, Phila., Pa.

Philadelphia Dental College, Philadelphia, Pa.

School of Dentistry of Meharry Medical Department of Central Tennessee College, Nashville, Tenn.

St. Paul Medical College, Dental Department, St. Paul. Minn. (Defunct.)

University of California, Dental Department, San Francisco, Cal.

Northwestern College of Dental Surgery, Chicago, Ill. (The diplomas of this college are discredited after 1889.)

State University of Iowa, Dental Department, Iowa City, Ia.

University of Maryland, Dental Department, Baltimore, Md.

University of Michigan, Dental Department, Ann Arbor, Mich.

University of Pennsylvania, Dental Department, Philadelphia, Pa.

Vanderbilt University, Dental Department, Nashville, Tenn.

The following officers were elected for the ensuing year: C. R. E. Koch, Chicago, Ill., president; L. C. Wasson, Topeka, Kan., vice-president; J. H. Martindale, Minneapolis, Minn., secretary and treasurer. The president appointed as the committee on dental colleges, Drs. Louis

Jack, T. S. Waters, E. E. Hughes, W. P. Church, and J. H. Martindale.

On motion, the following committee was appointed to consider the advisability of holding the meetings at some other time and place than the annual meetings of the American Dental Association, with discretionary power in the matter: Drs. J. Taft, F. A. Levy, and S. A. Garber.

Adjourned to meet at the call of the President.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

EXCELSIOR SPRINGS, MO., Aug., 1890.

Editor of the American Journal of Dental Science:

The seventh annual session of the National Association of Dental faculties was held at Excelsior Springs, Mo., commencing August 4. 1890.

The following colleges were represented:

Baltimore College of Dental Surgery, M. Whilldin Foster.

Boston Dental College, Wm. Barker.

Chicago College of Dental Surgery, Truman W. Brophy.

Kansas City Dental College, J. D. Patterson.

Missouri Dental College, W. H. Eames.

Ohio College of Dental Surgery, H. A. Smith.

Pennsylvania College of Dental Surgery, C. N. Peirce.

University of California, Dental Department, C. L. Goddard.

University of Iowa, Dental Department A. O. Hunt.

University of Michigan, Dental Department, J. Taft.

University of Pennsylvania, Dental Department, James Truman.

Vanderbilt University, Dental department, D. R. Stubblefield.

Louisville College of Dentistry, A. Wilkes Smith.

Indiana Dental College, J. R. Clayton.

Dental Department of Southern Medical College, L. D. Carpenter.

Dental Department of University of Tennessee, R. B. Lees.

University of Maryland Dental Department, John C. Uhler.

Columbian University, Dental Department, H. B. Noble.

On motion, Dr J. D. Patterson, Kansas City, was elected secretary *pro tem.*

The following resolution, offered by Dr. Hunt, was adopted:

RESOLVED, *That in all colleges of this association students to be graduated at the expiration of two years after admission must enter the school not later than twenty days after the opening of the regular session following this meeting.*

The amendment to the constitution laid over from last year, providing for changing the name of the association to American Association of Dental Faculties, was lost.

Applications for membership laid over last year, under the rules, were taken up and the following admitted: Royal College of Dental Surgeons of Ontario; College of Dentistry, Department of Medicine, University of Minnesota (represented by Dr. W. X. Sudduth); American college of Dental Surgery (represented by E. P. Hazen).

The following applications for membership were laid over under the rules: Dental Department of Howard University, Washington, D.C., and College of Dentistry, University of Denver.

The resolution offered by Dr. Patterson and laid over

last year under the rules was taken up, amended, and adopted as follows:

Resolved, That after the session of 1890–91 a diploma from a reputable medical college shall entitle its holder to enter the second course in dental colleges of this association, but he may be excused from attendance upon lectures and examinations upon the following subjects: general anatomy, chemistry, physiology, and materia medica and therapeutics.

Dr. Marshall's amendment to the constitution, providing that in all matters not in conflict with Article V of the constitution a majority of the colleges belonging to this association shall constitute a quorum, was taken up and adopted.

The following resolution, offered by Dr. Hunt was adopted:

Resolved, That we recommend that students take two full courses in studies of a general character, such as anatomy, physiology, chemistry, general principles of surgery, and materia medica and therapeutics, and three courses in those of a special dental character.

Dr. Goddard offered the following resolution, which was adopted:

Resolved, That final examination may be taken at the end of the second year in three general studies.

The following, offered by Dr. Truman last year and laid over under the rules, was adopted:

Recommended, That for a full annual course of lectures the minimum sum of college fees be $100; that diploma fees be omitted, and an examination fee of not less than $25 be substituted therefore and made non-returnable; that a matriculation fee of $5 be charged annually. Special course fees to be $10 for each branch taken, and $5 matriculation fee.

The following officers were elected for the coming year: L. D. Carpenter, Atlanta, Ga., president; W. H. Eames, St. Louis, Mo., vice-president; J. D. Patterson,

Kansas City, Mo., secretary; H. A. Smith, Cincinnati, O., treasurer; J. Taft, Cincinnati, O., Truman W. Brophy, Chicago, and A. O. Hunt, Iowa City, Ia., executive committee.

The following committees were appointed: James Truman, Philadelphia; Frank Abbott, New York; and John S. Marshall, Chicago, *ad interim* committee; J. A. Follett, Boston; D. R. Stubblefield, Nashville, Tenn.; A. Wilkes Smith, Richmond, Ky., G. L. Goddard, San Francisco, committee on schools.

Adjourned to meet on Saturday, August 1, 1891, at 10 o'clock A. M., at the place appointed for the next meeting of the American Dental Association.

Editorial, Etc.

GERMS IN A BABY'S JAW.—HOW THE FIFTY-TWO TEETH COME OUT INTO THE DAYLIGHT.—"The development of the teeth germs, from infancy to mature life, is one of the most interesting phases of human growth. Pass the finger along the tiny jaw of the newcomer. Not only is there nothing which presages future teeth, says an exchange, but the jaws themselves seem too delicate and frail to become the sockets for such hard working portions of the anatomy. Yet there are fifty-two tooth germs hidden there, waiting their time, though not all of them could be detected by the most skillful detection. Twenty of these are for the temporary teeth, with which, in due time, the child will begin to gnaw or chew his way through life; the others include the permanent set and the molars, none of which begin to make their presence known till the child is about six years old, and the "wisdom" teeth do not usually appear till about eighteen.

The little pulp-germ grows and develops till it approxi-

mates the shape of the tooth it is to become; then it begins to calcify, forming the dentine part of the crown, while the enamel is deposited by an independent process. The surface of the crown attains its full size before the process of elongation commences. Then gradually it pushes its way outward through the gum, absorbing the tissue as it advances till the pure white enamel peeps out, to the mothers great delight. The first sight of the incisors usually appears at about the age of five months, and the temporary set of twenty is completed at about three years of age, but there is no uniformity or certainty in regard to the age or which of the four central incisors will first appear. The process of "teething" is almost invariably one of disturbance to the health of the child; he is liable to fret and worry, especially if the outer membrane or skin of the gum proves tenacious and does not readily absorb. In this case it should be lanced—an operation which is humane, in that it relieves the discomfort of the child, and is entirely harmless, as there is seldom any hemorrhage worth the name, and if there should be a slight flow of blood, it readily yields to simple treatment. The application of a dust of powdered alum is usually sufficient."

Bibliographical.

A NEW MEDICAL DICTIONARY.—A new dictionary including all the words and phrases used in medicine, with their proper pronunciation and definitions, based on recent medical literature, by George M. Gould, B.A., M,D., Ophthalmic Surgeon to the Philadelphia Hospital, etc., with tables of the Bacilli, Micrococci, Leucomaïnes, Ptomaïnes, etc., of the Arteries, Muscles, Nerves, Ganglia and Plexuses; Mineral Springs of U. S., Vital Statistics, etc. Small octavo, 520 pages. Half dark leather, $3.25; Half Morocco, thumb index, $4.25. Philadelphia: P. Blakiston, Son & Co.

The object of this new Dictionary of Medicine is explained in the following extract from the preface:

1. To include those *New Words and Phrases* created during the past ten years—a period rich in coinages—which appeared destined to continuous usage. There are certainly thousands of these, and in their compilation I have especially endeavored to cover the latest results in the study of Bacteriology, Ptomaines, Leucomaines, Electrotherapeutics, Embryology, Physiology, Pathology, etc., and in the various special branches of medicine such as Ophthalmology, Otology, Laryngology, Gynæcology, etc.

2. To frame all *definitions* by the direct aid of *New Standard, and Authoritative Textbooks*, instead of making a patchwork of mechanical copying from older vocabularies.

3. While neglecting nothing of positive value, to *omit obsolete words* and those not pertinent to medicine except in a remote or factitious sense.

4. To make a volume that will answer the needs of the medical student and busy practitioner, not only by its *compactness of arrangement* and *conciseness of definitions*, but also by its *convenience of size* and *price*.

A few dental mistakes may be noted: "Eye teeth" are defined *Incisor Teeth* instead of Canine Teeth, and "Premolars" are defined as the *Molar Teeth* instead of the Bicuspid Teeth, to which latter teeth the term *Premolars* is commonly applied. The condensed form of this dictionary which, notwithstanding, is very voluminous in words and definitions, will render it a very convenient, as well as useful, text-book.

A NEW DENTAL JOURNAL, under the title of *The Dental Mirror*, Dr. R. Ottolengui as editor, issued the first number in June last. Dr. Ottolengui is well known as a contributor to dental literature, and no doubt but that his new journal will meet with great success.

A CHANGE OF EDITORS.—Dr. Sudduth after a very successful career as the editor of the *International Dental Jour-*

nal, has retired and been succeeded by Prof. James Truman. who is well known to be highly qualified for editorial work. We predict a successful era in the history of this Journal under the able management of Prof. Truman.

CATCHING'S COMPENDIUM OF PRACTICAL DENTISTRY.—We learn from Dr. Catching that his compilation of practical matter of the current dental literature during the year, is assuming splendid proportions, and is meeting with fine success, being very favorably welcomed by the "wide-awake" dentists. We anticipate a valuable publication from this Compendium and wish it every success. $2.50 per volume. B. H. Catching, D.D.S., Atlanta, Ga. Sold only on subscription.

THE STUDENT'S MANUAL AND HAND-BOOK FOR THE LABORATORY—Second Edition—By L. P. Haskell, Professor of Prosthetic Dentistry, Dental Department of the North Western University, Chicago. Publishers: Wilmington Dental Manufacturing Company, Philadelphia, 1890. Cloth $1.50. This new edition is larger than the first, and presents a handsome appearance. Although a very useful record of hints, &c., yet it is wanting in minute details and more lengthy descriptions, which its author is well able to present in a much larger work, which would be appreciated by the dental profession.

We hope to see in the near future, a third edition, which will embrace much more matter pertaining to the dental laboratory, than the present edition presents, thus greatly enhancing the value of this manual and rendering it still more useful to the dental student.

THE

AMERICAN JOURNAL

—OF—

DENTAL SCIENCE.

VOL. XXIV. BALTIMORE, SEPTEMBER, 1890. No. 5.

ARTICLE I.

SOME THOUGHTS ON CROWN AND BRIDGE-WORK.

BY W. MITCHELL, D. D. S., LONDON, ENGLAND.

Read at the Meeting of the American Dental Society of Europe, August, 1889.

Mr. President and Gentlemen:—It is not so much the purpose of this paper to present anything new as it is to sift out and secure to us that which will prove of most value in every-day practice, and be a guide to those commencing in this branch of operative dentistry, whereby they may trace an outline of procedure that will insure a minimum of unsatisfactory experiences, which are nearly always associated with our earliest efforts, and secure a maximum of satisfactory operations, both to the patient and to the operator.

Crown-work, in the abstract, has passed through possibly more stages of evolution than any other of our methods of restoring facial contour, or defective articulating

or masticating power; and the outcome of the vast amount of thought and experiment that has been expended upon it is manifest in the various and numerous systems at our selection. The result is for good, for it is hardly possible to conceive of a case where the tooth or root is solid, and the adjacent tissues in a warrantable condition, where some kind of crown may not be used with comfort and benefit to the patient. Roots may be rendered more healthy and more in harmony with adjacent structures, and need considering much less as a factor in peripheral irritation, when properly treated and crowned and restored to legitimate use than when left excised and in a ragged condition, as a supposed support to a plate that frequently is a match for them in its filthy and unwholesome condition, a state of affairs brought about by wilful culpability by the addition of a necessarily ill-adapted artificial appliance to an already unsanitary and vitiated mouth.

To bridge-work, as frequently made, the foregoing remarks apply with particular emphasis; and while bridge-work in selected cases is undoubtedly a boon to the patient and a credit to the dentist, its common or indiscriminate use will undermine its real advantages and cause it to be looked upon with distrust and loathing, the first proposition promoted by lack of judgment and discretion, and the second by an ignoring or inability to recognize the fine mechanical manipulative requirements necessary to its perfect production and adjustment. Here I might mention, I deprecate most earnestly the indiscriminate excision of sound teeth, and drilling for anchorages to secure supposed supports for bars and footings; for in the one case very likely a perfectly sound tooth has been sacrificed, and in the other all the worst elements of an approximal cavity have been promoted, without any of the subsequent advantages of isolation, as is the case with a well polished and self-cleansing surface of an ordinary filling. Already, in England and America, the charlatans who pose upon their capacity for "crown, bar, and bridge-work" are construct-

ing animated sewers whose vitalities are being sapped by the indiscriminate insertion of these—in many cases—"fearfully and wonderfully-made" appliances.

In my opinion, we have in bridge-work a valuable adjunct to our prosthetic *repertoire*, and one which, in capable and judicious hands, may be productive of much good; that the reverse of this is also true, it is scarcely necessary for me to suggest to my present audience.

I wish to lay special stress upon the necessity of carefully diagnosticating a case where a piece of bridge or bar-work is to be inserted, for, unless the diagnosis is a correct one, it necessarily follows the prognosis will be proportionately unfavorable. This applies more directly to bridge-work than to the adjustment of crowns, although with either, the requirements of the case as regards position, work to be done, adjacent and antagonizing teeth, all these points should be carefully noted, when a selection from the various methods should be made that is considered best suited to the case.

After some considerable experience in this class of operations, I have found the half cap, as still used by many, to be worse than no cap at all, affording, as it does, an exit for the cement or other retaining mediums, and subsequently a receptacle for food and secretions that rapidly decompose, making, what should be a thing of beauty and service, a veritable whited or gilded sepulchre.

For molars and second bicuspids the all-gold crown stands pre-eminently at the head of the list, possessing at once the greatest possible range in adaptability to more or less broken-down roots, restoration of masticating surface, cleanliness, and durability. It will thus be seen, if my claims are well founded, the gold-cap crown leaves little to be desired.

From an æsthetic stand-point it is inartistic where exposed to view; but if I had to choose between some of the miserable abortions called artificial dentures, superimposed

upon roots reeking with morbid products, as we frequently see them, and alleged to be artistic, I should unhesitatingly prefer the inartistic and cleanly to the artistic and filthy.

But right here we are afforded an opportunity of combining utility with art, and securing a perfect result, for, by utilizing the principle of the gold-cap crown,— *i. e.*, a cap with a porcelain crown or facing,—we have a combination that leaves little to be desired. The Logan crown has been utilized this way, and I believe with very satisfactory results. I believe a solid porcelain tooth makes a much more desirable crown than the plate or flat tooth, for they can be adjusted to the cap with the minimum of heat, and are much less liable to come to grief in ordinary use than are the flat or plate teeth; this being the case, about five years ago I devised a crown and attachment, using Ash's tube teeth, that admitted of a range of adaptability that has proved very satisfactory, their colors leaving little to be desired; and while only having used a limited number of these crowns, I am exceedingly well pleased with the results. Dr. Case, of Jackson, Mich., U. S., about two years ago spoke of nearly the same method as giving very good results, and within the past year in England the same method has found favor to some extent.

The Knapp system of solid gold crown merits notice from an artistic stand-point, and recommends itself to those who have the time and inclination to do what may just as easily be accomplished in one-fourth the time, and that, too, in many cases with less sacrifice of dental tissue.

The porcelain-faced crown, built up by the same process, I tried more than a year before Dr. Knapp's method was known, but I discarded it as a time-waster, and in preference use the method previously spoken of.

I have found that the deep collars or bands, which at first were supposed to be requisite to the success of an operation of this kind, to be quite unnecessary, a narrow one being better and much more compatible with the

anatomical surroundings, and promises a greater success than experience has proved deep bands capable of; the reason for this is, there is less irritation produced while fitting them, and much less danger of the rupture of the dental ligament and the subsequent recession of the gum, thereby causing the band to be severely in evidence, and through its exposure, combined with gingival irritation, a nidus is afforded for deleterious products that become factors in defeating the objects of the operation.

I think in some cases the band may be entirely dispensed with to advantage; where the root is an indifferent one, it may readily be restored with amalgam and mounted with a crown; this in many cases will restore to usefulness a root that may long have been out of service. I have resorted to this method with advantage, restoring quite satisfactorily an otherwise faulty articulation and obviating the necessity of a plate.

The Bonwill crown offers in many cases facilities afforded by but few others, combining appearances, range of adaptability, and comparative ease of adjustment that goes far towards making it a desirable acquisition. In connection with crown-work, the Gates-Glidden drill has proved in no small manner to be a factor in our successes. I believe in a thorough preparation of the root, and the fitting of a suitable pin or pins to each case. I do not use a stereotyped pin, but frequently have to make one to suit a particular case, for by having a pin adapted to the size and contour of a root contributes in no small measure to the ultimate results of an operation. While it is well to be conversant with the various kinds of crowns, I think in practice we will necessarily confine ourselves to a very few, for it is much better to become experts in a few methods than to dabble in many, as the end desired is the same in all cases, and in proportion to the complexity of the operation, in proportion is it removed from the average operator. Simplicity of process, when producing satisfactory results, will be admitted on all hands the desideratum

of the active practitioner. In our public utterances we are more likely to speak of our successes than we are to descant upon our failures, though who of us here assembled have not made them? And having made them, I hope we have turned them to account by noting and analyzing for the cause that produced the undesired results, and having done this, let us so shape our future work by formulating a definite line of practice whereby we shall reduce to a minimum the element of failure, or modified success that must ever be present where indecision or absence of a definite plan accompany the earlier stages of an operation.

The famous aphorism, "be sure you are right, then go ahead," only needs a slight modification to be quite applicable to our profession,—be sure in your diagnosis, then proceed with the treatment. I cannot help but think the perfection or elaboration to which the mechanical part of bridge-work has arrived has to quite an extent been at the expense of its utility, and by mentally deficient enthusiasts its greatest benefits have thereby been debased.

An utter ignoring of the physiological principles and processes that form the substratum of all dental operations seems to me to be more the rule than the exception in this class of operations, and by the—in many cases—tendency towards mechanical novelty. Physical requirements have been forced into the background in a manner that does not redound to the credit of the members of a profession whose foundations are supposed to be built upon the bed-rocks of anatomy, histology, physiology, and chemistry. This belief is more thoroughly enforced upon me when I see in our journals cuts and details of wonderful appliances supported upon foundations of the flimsiest description, showing their advocates to be entirely destitute of a knowledge of the elementary principles of mechanics, which inferentially, if not conclusively, bespeaks a poverty of general fundamental detail that in almost any calling should debar their

utterances from gaining publicity, to the detriment and misleading of the younger members of our profession.

There are very few superfluities in nature; therefore we must conclude originally our dental complement was perfect for the purpose intended; that we can and do succeed fairly well in living with imperfect dentures is no argument in favor of superimposing an entire set of teeth upon three or four faulty roots, and when men get up in societies and state that "bridge-work can be successfully inserted upon a few loose roots that are in an advanced state of pyorrhœa alveolaris, thereby rendering them firm and solid," it is time for the profession to call a halt upon such fallacies, and inquire if some asylum has not discharged one of its late patients as "incurable."

Absurd ideas and statements always have, and probably always will have, advocates; but I hope there is sufficient mental ballast and moral back-bone in the profession to negative and overcome such fictional emanations, and instead of allowing them to pass current by kindly ignoring them, denounce them in an unmistakable manner, thereby locating a rock and preventing the stranding of some professional brother who may be unwittingly drifting within its treacherous influence.

The cases that present themselves for our consideration are of such a varied nature that special description would avail but little here, each case necessarily having to stand upon its own merits; but with a clear conception of the anatomical, physiological, functional and mechanical aspects of the case, and a moral motive force impelling towards the greatest good to our patients, there can be but one outcome to our efforts.

I can only speak positively of fixed bridge-work, not having had any personal experience with the movable kind. The reason I have not made movable work is owing to the few cases where it is possible to secure anchorages or abutments upon parallel lines; where these are not

naturally so, it is an operation involving a great deal of time and patience for their artificial production, this, combined with the disadvantages incidental to the enforced use of soft gold or platina in the construction of the work that must necessarily have a certain amount of play to insure of its removal, is in my mind an argument against its general adoption. There are also other points upon which its advisability may be questioned that will present themselves upon a little study of the subject.

Fixed bridge-work has advantages over plate-work that cannot be denied, but, as I have before stated, it is a full appreciation of the requirements of the case that conduces to its success; it can be so constructed as to be as cleanly and as comfortable as the natural teeth; and if, as is often necessary, the articulation is modified to suit the indivividual case, a source of comfort and utility is afforded the patient impossible by any other means.

The various means for the retention of crowns and bridge-work are commensurate with the work itself. Amalgam, gutta-percha and cement may all be used to advantage; an ethereal solution of sulphur may also be used. I prefer for both crowns and bridge-work a fine-grained, slow-setting phosphatic cement.

Never use oxychloride of zinc for setting crowns, the chemical action is so rapid and pronounced that the destruction of the adjacent soft tissues is sure to follow, accompanied with much pain.

In conclusion, if your work is based upon correct principles, the work mentioned in this paper will prove a remunerative as well as a successful and interesting portion of your practice.—*International Dental Journal.*

ARTICLE II.

DENTAL EDUCATION.

DELIVERED BEFORE THE TEXAS DENTAL ASSOCIATION 1890, BY DR. J. H. GRANT, OF PALESTINE, TEXAS.

Education is one and the same thing, whether it pertains to a profession or trade. It is that acquired knowledge which brings man in contact with his fellow man in a high degree of culture, refinement and morals. The benefits of education are not confined alone to the person educated.

Education is the very root of heredity. The sharpened intelligence, strengthened faculties and improved morals which it gives are an estate that is transmitted by blood from parent to child in obodience to an immutable law of nature.

Its beneficial results are a property, which by the law of natural transmission, becomes a fixed estate in a man's posterity, and of which he cannot be deprived, either by legislative enactment, judicial fiction or any man's fraud or dishonesty.

The great scholar, Gibbon, has told us that every person has two educations, one which he receives from others and one more important which he gives himself.

And thus we see that our annual Dental meetings have a responsibility resting upon them to-day as a profession, to advance the younger men to that degree of scientific knowledge and practical skill, that will not only claim the attention of the medical profession at large, but claim the attention of the scholars of the world. We have, it is true, able writers, learned professors and skilled operators, with perhaps, a fair proportion of members of respectable talents and attainments, and yet we know and realize

that there are many in our ranks who are deficient in the attainments and skill necessary to bring them up to that standard we should desire.

And if as a profession, we the members of this Association, strive to do what I conceive to be our duty and that, that the Chairman of your Executive committee has suggested, we will bring our meetings up to that degree of scientific proficiency that will cause our meetings to rank, as a post-graduate course, lasting for all time to come. It is in our annual meeetings that the devices for one member suggests ideas to another that stimulate him to further research and experiment. Our profession has made great advances in dental science and learning in the last thirty years and I will admit that the knowledge is not seen only in the principles and practice of the profession, but also in the character and standing of its members.

It has not been a great while since a dentist was thought to require no other talent and skill than that of a a country barber, but to day it stands risen to the dignity of a profession equal to that of any other, and which to be successfully followed demands long and careful study, thorough knowledge and practical skill, superior in some respects to any other profession.

It is true that quacks are common to all professions and vocations, but they are more degrading to dentistry because the public have no certain means of distinguishing between the qualified and those who are not, and I regret to say that it appears that the time has come when a man must be estimated by the printer's ink he displays in his daily papers or barn-door posters scattered on the streets, calling special attention to different grades of work, and many instances superior classes of work, and all work guaranteed. Must we always submit to such quackery and imposition? I hold that it is an imposition, because the credulous are imposed upon in many instances to their discomfort and sorrow. If I was the president of a dental

college, I pledge you my word, I would require every graduate earning his diploma to obligate himself on receiving it not to pull his alma mater down, by resorting to such quackery and charlatanism. I dislike to be arrogant or exclusive; it is desirable and inevitable that there should be a wide difference in the standing of dentists in any community.

The great question of to-day is how are we to remedy this? It can only be done by compelling every one who comes to our state to present a certificate of identity with the profession including his diploma, or stand an examination before their board who should have the authority to cause the arrest of any man who should resort to such advertisements as are often seen on our streets and in our daily papers. I believe in legitimate advertising in keeping with the dignity of any profession, but this wild-cat style some have I do condemn, and I think the better element in a profession always will. In this connection I will also speak of the district boards. The law as it is, we all know to be defective, but lame as it is, it is some help to us. While it admits a great many that are not thoroughly qualified under the preceeding clause, it gives us as members of these boards, when a man comes to locate who has no diploma, the authority to submit a rigid examination, to ascertain his qualifications, and in order to maintain and encourage the dignity of our profession in Texas, especially. If you agree with me, in increasing our membership and elevating our meetings to that standard that they stand as a post-graduate course, will say, that these district boards should be capable of examining an applicant on anatomy, physiology, pathology and surgery, indicating an examination entitling those who can creditably sustain themselves there into professional rank.

Then if in the departments of materia medica chemistry, operative and mechanical dentistry, the examinations are equally rigid, we may have no fear that a man willing to stand such an examination and who does stand it should

feel proud to enter our ranks. You may think that I require too much of a student before he be allowed to practice our specialty. Do you not agree with the profession at large in wanting to elevate the standard of dentistry? If you do, then do you not say that the student who would practice our specialty should have a respectable knowledge of the bones, their most important parts and articulations, the names and positions of the principle arteries, veins and nerves, the form and regulation of the head, chest and abdomen, and of the structure and properties of the principal tissues, of the functions of digestion, absorption, circulation, respiration, secretion, motion and sensation.

The surgical anatomy and physiology of the organs of mastication, deglutition, taste and articulation, or inflammation and its consequences, of the healing of wounds, of the method of arresting hemorrhage, of the union of fractures, of the administration of anesthetics and the treatment of threatened death from their employment; of the diseases and injuries of the mouth, jaws fauces, and adjacent parts.

If the standard of qualification in these branches alluded to and especially in the mechanics both of office and laboratory are correspondingly high, there is no reason why such candidate should not be entitled to practice our specialty, known as dental surgery, and the qualifying of of young men after this manner is a sure way of introducing material that will always take a pride in elevating our profession and attending our meetings.

If we are ambitious and desire to elevate the standard of dentistry and our meetings above that usually accorded them, we must confine ourselves to closer study of the oral lessons and thereby through special concentration acquire proficiency in the diagnosis and treatment of all abnormal conditions of the mouth.

We all know that specialism is the inevitable outcome of the extension of medical art and science, and it is also

acknowledged that it is impossible for any one man to master medical and surgical practice in all of its details. The wonderful advances which have been made in oral and ophthalmic surgery by dentists and specialists in other branches of medicine and surgery have compelled both popular and professional recognition.

The variety and importance of dental lesions demand a special and thorough preparation, special opportunities and special practice, in order that the highest results in their treatment may be secured.

It should not be that a mere compliance with arbitrary rules and attendance at the lectures of a college, with only a superficial examination at the close of the session, are requisite to qualify a candidate to receive his diploma, or practice upon his own responsibility.

No one should be allowed to receive a degree upon superficial knowledge. The applicant must earn his degree, and his title to it should be tested by a full and exhaustive examination in all the branches of knowledge with which a dentist should be familiar, for the successful practice of his profession and for the maintainance of an honorable position as a professional upright man.

I hold, however, that any one, who by his industry and perseverance has qualified himself to pass a rigid and satisfactory examination without the aid of colleges, is entitled to take rank in any profession equal to those who more favored by circumstances have been able to avail themselves of the important and to many, the necessary aid, which the colleges afford.

You may take our colleges of to-day or the office of a private preceptor if you please, and have either with a proper organization.

A course of study which carries the student progressively and systematically from one subject to another in a just and natural order and which is followed by minute examinations, that enforces a mental discipline, and which is

of incalculable benefit to the student, and one that insures a thorough training in certain branches of dental instruction which could not be acquired under any other system.

This training is of special importance in the early years of a student's life and paves the way for the work he has before him in after practice. And the time is not far distant, when every dentist will have to acquire that knowledge of these studies already mentioned before he be allowed to practice, in order that he may be able to impart such knowledge to his patients and those he is brought in daily contact with.

There is a great demand to-day upon the profession for a higher order of acquaintance with different pathological conditions, and particularly in correct diagnosis, hence we—and by we (I mean colleges, private preceptors and dental meetings) must bring educated men into the profession both in literature and science, with minds that can make the fingers work out the thoughts of the brain, not merely a scientific knowledge or dexterous workmanship, however important both may be, but educated labor is the demand, and is this met?

I regret to say it is not. Our dental journals annually state that the yearly additions to the profession does not fall short of six hundred persons. Of this number only about one-third are graduates of respectability.

Now, then, I would ask how can this educated labor be attained? If not in dental colleges, can it be acquired from a private preceptor?

It cannot in the full sense of the word, for the reason that the private preceptor cannot make each department of dental science a particular and constant study. If delicate manipulation is desired, perfection in mechanical work must necessarily receive a limited attention.

And another obstacle is, that he has not the conveniences for illustrating and demonstrating that important knowledge in anatomy chemistry, physiology and pathol-

ogy, an acquaintance with which is as essential to a dental practitioner for the basis of a sound practice as it is for him to discriminate between a cut artery and a cut vein, when called to arrest a hemorrhage.

In conclusion I cannot refrain from speaking of one other evil that is unfortunate in our dental colleges as well as in the medical colleges, which is to-day lowering the status of all professions, and that is, the cheap grade of instruction imparted at our dental colleges, by a spirit of rivalry, the mania that has sprung up in our profession of starting new dental colleges can only be attended with injurious consequences. This, if continued, will tend to degrade the standing of granting a diploma, the bad effects of some we have already seen, by the exposure made by these short-lived institutions in the way of bestowing honors.

The profession does not need more colleges, it needs less in number and a better quality. The faculties of these could then be composed of the best talent and pecuniarily sustained. Able instructors could then devote their whole time and attention to the duties devolving upon them, and the results would show themselves; results that as dentists proud of our profession we should uphold and encourage and insist that every young man receiving a beneficiary certificate from this Association, not only attend the first course, but obligate himself to obtain his degree.

If this is done we can in a measure, do away with a superficial knowledge only acquired, and demand a thorough course both in theory and practice, that will compel recognition to the advancement already made and that has characterized our profession during the last half century. —*Texas Dental Journal.*

ARTICLE III.

THE CONSERVATIVE TREATMENT OF THE DENTAL PULP.

BY DR. A. C. HUGENSCHMIDT, PARIS, FRANCE.

Much has been said and written concerning pulp-capping. Many have claimed success and an equal number have reported failures. It is a noticeable fact that, though the rupture of a pulp is practically similar to a wound on other soft tissues, the treatment in vogue is usually totally different. An inflammation of the pulp is the same as any other inflamed tissues, and calls for similar treatment. The pulp is a highly organized tissue supplied with nerve, artery, and vein, and there is good reason to believe, with lymphatics as well.

When a pulp is exposed it is no uncommon practice to touch the wound with a coagulant. A surgeon who would so treat an ordinary wound would be considered insane. The coagulum, requiring adsorption, would undoubtedly act as an irritant and obstacle to the healing process. If this is true in the larger wounds of the body in tissues not over-sensitive, how much more must it be true of the dental pulp? To those who demand that a coagulum is needed as a protection to the pulp at the point of rupture, it will suffice to say that the air is a coagulant, and that blood cannot be exposed even momentarily without a delicate film being formed.

In treatment of the pulp my practice has been to wash out the cavity with sterilized water, saturated with a 1-2000 solution of bichloride of mercury. The capping is powdered iodoform, or salol mixed with lanolin and covered with mica, the rest of the cavity being filled temporarily with oxy-phosphate or oxy-chloride of zinc. Mica is a

most valuable capping, being thin and a good non-conductor.

In cases where the pulp is fully exposed, unprotected by decalcified dentine, and presenting a cherry-red color in place of the normal rosy tint, it should not be capped at once. It is an inflamed wound. Where there is inflammation about a wound the surgeon hesitates about closing the opening. Even after days or weeks of treatment, when at last he concludes to unite the edges of the wound, hoping for final healing, he invariably inserts a drainage-tube.

Some of us think that all cases of pulp exposure should be capped at once. In case of inflammation the immediate capping results in inclosing inflammatory products, which become a source of irritation. Patient complains of occasional shooting pains, which may eventually pass away; but the pulp is dying. If the patient is anæmic these pains become worse till the patient insists on the removal of the filling, and the destruction of the pulp is then inevitable.

Here especially coagulants are contra-indicated. A disinfectant which is also a coagulant is self-limiting. *All below the coagulum remains in a septic condition*, the coagulum thus becoming a barrier against further treatment. Never cap at the first or second sitting. Use antiseptic dressing only. The procedure is to remove the decay, not objecting to exposing the pulp. If sensitive apply a saturate solution of muriate of cocaine, or even the crystals. The result largely depends on removing the decay, which is septic.

As a dressing iodoform powder has been my dependence since I first heard it recommended by Truman. Sometimes I use salol. Iodoform or salol powder may be used in lower teeth, but in the upper teeth it should be mixed with lanolin, applied to the exposure, and covered with mica or gold, and then with gutta-percha or oxy-phosphate. This dressing should be allowed to remain in place a week.

When removed a slight trace of pus may be detected on the absorbent cotton used to carry the dressing, in which case the dressing must be removed.

Two to four treatments should be resorted to before final capping. This final capping should only be placed when pus has ceased and the normal rosy color of the pulp has been restored. If cotton is used with gum sandarac as the temporary fillings, care must be used to separate with a piece of mica, this cotton filling, from the cotton which carries the lanolin and iodoform dressing. The permanent capping and filling has been described.

Another class of cases is where the exposed pulp is freely suppurating, and possibly neighboring parts are found in similar condition. The treatment is the same, but the dressings are to be made more frequently; they should be removed every three days. The exposure must be cauterized with carbolic acid, applied to it for a moment. The cautery is to be renewed or not as indicated by the appearance of the pulp at each dressing. If, after the fifth or sixth treatment, no improvement occurs, the case may be counted hopeless and arsenic applied.

I have met cases where the suppuration continued, though the surface of the pulp which was in sight appeared healthy. In such cases it is probable that the suppuration comes from a point on the side of the pulp near the foramen, the pus exuding between the pulp and the canal wall. In two cases having straight roots the pulps were removed under cocaine, and the microscope disclosed such a condition.

To sum up, we may say that—

First—In healthy, freshly exposed pulps salvation is not only possible but probable.

Second—Pulps long exposed but not suppurating can be saved in the majority of cases.

Third—In suppurating cases the pulp can only be saved after proper antiseptic care, and not in all cases.

Fourth—Tumors of the pulp require extirpation and the removal of the entire pulp.

DISCUSSION.

Dr. Atkinson.—I think that it is a very audacious statement for any man to make that he can discover that a pulp is suppurating from a point which is not visible. Any part of the body which has life enough in it to suppurate can be restored to nutrient activity and be healed by granulation, provided the neighborhood can be kept healthy.

Dr. Ottolengui.—I do not wish to appear to contradict or oppose Dr. Atkinson, but I wish to defend my friend Dr. Hugenschmidt. I think Dr. Atkinson has misunderstood or misapprehended him. He did not say that he can tell when a pulp is suppurating from a point not visible. He claims that in some cases where the parts appeared healthy and yet suppuration continued after five dressings, he suspected this to be the fact. He tells us that he examined two such cases after removal, and the microscope exposed such a condition.

Dr. Atkinson.—God pity the man who needs to dress these cases five times.

Dr. Patrick, Illinois.—I never have saved a ruptured pulp. I have been told that I can cut away a part of a pulp and save the rest. I can't. Atkinson says that any part of the body can be restored to health after suppuration. I say he is wrong. There are parts of the body which cannot be restored. The pulp is one; the synovial membrane is another.

Dr. Genese.—Would Dr. Patrick destroy a pulp exposed when healthy? I had a patient who had had a tooth filled with gold. The pulp had been destroyed and removed and the root filled; no abscess occurred. She, however, suffered much from neuralgia, and claimed that from time to time she felt something burst, after which she would have temporary relief. This "bursting" would be

followed by a discharge from the nostril. As it was plain that there was pus in the antrum, the tooth was removed. The root was found necrosed. Antiseptic treatment brought about a cure. Patient has had no pain since. I relate this as a warning against the wanton destruction of pulps.

Dr. Young, Alabama.—Inflammation of the brain cannot be cured. A crushed limb must be cut off; it cannot be restored to health. It is the same with the exposed inflamed dental pulp. After a pulp has ached it is no longer connective tissue; a metamorphosis occurs, and it becomes striated, like muscular tissues. A painless method of applying arsenic to destroy a pulp is to use this formula: Cocaine, four parts; antipyrine, four parts; acetate of morphia, four parts; arsenic, three parts. Mix with lanolin.

Dr. Patrick.—No wound can heal without lymph; no lymph can be produced without the lymphatic gland, and no glands have ever been proved to exist in the pulp. I know what I am talking about. A man cannot appreciate what the use of the microscope means unless he devotes himself exclusively to it. I have spent a great deal of money and used up a great deal of time in microscopical examination of dental tissues. I say no one has shown lymphatics in a pulp.—*Dental Mirror.*

THE NEW THEORY OF THE ACTION OF CHLOROFORM.

BY THOMAS GADDES, L.D.S., ENG. & ED.

It has been pointed out in the editorial pages of the Dental Journals, that an operation with "a small dose of chloroform is a Dangerous thing." That statement was based upon certain experiments by Dr. Lauder Brunton, the results of which appeared to be born out by the clin-

ical experience of many observers, and by the evidence so frequently obtained at inquests, viz. :—that (by way of showing that death was not due to an incautious overdose) the patient was not fully anæsthetised, or was recovering from the more profound effects of chloroform, when, during the removal of the "last" tooth, or the insertion of the final stitch, death, ensued. In such cases it was argued that chloroform was a direct sedative to the action of the heart; that it reduced the excitability of the cardiac (motor) centres of the sympathetic; that, common sensation not being overcome, the "trivial" operation was perceived by the sensory centre in the medulla; that a resulting impulse was transmitted to the adjacent centre of the pneumogastric and, through that nerve, to the heart inhibiting its already impaired action, failure of the heart ensuing. Thus death from shock and syncope was held to take place; and it was further maintained that, had the patient been fully anæsthetised throughout the operation, shock would have been avoided and syncope, at least from that cause, averted. To day that teaching of the physiological action of chloroform has to be, not simply amended but almost entirely reversed. The experiments of the Second Hyderabad Commission give grounds for a different interpretation of the phenomena attending the administration of chloroform from what has hitherto generally been accepted. The results obtained by the First Commission were so much at variance with those acquired by other experimenters that a Second Commission was organized, having among its numbers that distinguished physician and scientist already referred to—Dr. T. Lauder Brunton, F.R.S. The Second Hyderabad Commission confirmed the conclusions arrived at by the preceeding one and, furthermore made several important discoveries, some 500 animals having been killed in the experiments. The report of the commission has not yet been published in a complete form, although important selections from it have at different times appeard in the *Lancet*, to which journal I am indebt-

ed for the information which I possess and for the extracts which follow.

These extracts do not by any means cover the whole ground traversed by the experiments. They are, however, sufficient to show that certain hypotheses as to the action and the safety or danger of chloroform are not in accord with the conclusions obtained from the recent and the most elaborate series of experiments ever carried out in that connection. The extracts are arranged in such order as to bear upon the successive stages in which death was supposed to occur in the case depicted above.

"The three series of experiments show that simple chloroform poisoning causes paralysis of the respiratory centre, and then gradual death, the heart being the last organ in the body to die. And, however concentrated the chloroform may be, it never causes a sudden death from stoppage of the heart."

"Chloroform, when given continuously by any means which insures its free dilution with air, causes a gradual fall in the mean blood-pressure, provided the animal's respiration is not impeded in any way, and it continues to breath quitely without struggling or involuntarily holding of the breath. But it must be clearly understood that such fall of blood-pressure is in no sense a danger, in any case which is fit for an operation, unless it is excessive—that is to say, unless an overdose of chloroform is inhaled.

"That struggling during chloroform inhalation, or anything which interfered with the breathing in any way, such as holding the breath or aspyxia, produced irregularities in the circulation and in the action of the heart.

"Chloroform has no power of increasing the tendency to either shock or syncope during operations. Every operation that ingenuity could suggest, or that has ever been supposed to be dangerous under chloroform, was performed by the Commission in every stage of Chloroformisation, without any effect upon the heart, the pulse, or the blood-pressure.

"That inhibition of the heart's action and slowing of the circulation with rapid fall of pressure, caused by irritation of the vagus, proved to be a safeguard—rather than a danger,—preventing the anæsthetic from being carried too rapidly from the lungs to the nerve centres. That an effect precisely similar to that caused by electrical stimulation of the vagus is produced through the same nerve: (*a*) in the holding of the breath, which occurs in the early stages of chloroform administration; (*b*) in asphyxia; and, (*c*), sometimes after the respiratory centre is paralysed in the later stages of chloroform poisoning."

As soon as this safeguard action of the vagus was demonstrated, it became clear "that chloroform and shock were not associates but incompatibles; and that the supposed capricious action of chloroform upon the heart was due either to the stimulating effect of concentrated vapor upon the nervous system (the vagus), or to the effect of the asphyxial blood upon the nerve centres, resulting in the exclusion of the poison from the system, and not the direct effect of the absorbed poison upon the heart or its nerves."

"Though fall of pressure is inseperable from chloroform administration, there is never the least danger if it falls regularly, and if the inhalation is stopped directly the state of the cornea shows that the patient is 'under.' Regularity of the blood-pressure depends entirely upon regularity of the respiration. Any irregularity, therefore, in the fall of blood-pressure during chloroform inhalation, indicates irregularity of, or interference with the respiration; and, *per contra*, any irregularity of, or interference with the respiration, at once causes irregularity in the fall of blood-pressure; but as long as the respiration is regular and not interfered with, the fall of the blood pressure will exactly correspond with it, and will cease long before a dangerous point is reached, *if the inhalation is stopped when the cornea becomes insensitive*, or other signs show that the patient is 'under.' If the respiration is kept up without struggling, holding the breath, or asphyxia, chloroform may be given slowly or quickly, freely and with perfect confidence, without the slightest risk to the patient.

The Commission has demonstrated that the aim of the surgeon must be to give chloroform so that the blood-pressure should fall regularly throughout the whole administration, and that the blood-pressure can only be kept free from irregularity of the breathing. The chloroform must therefore, be inhaled in such a way that the breathing is natural and regular throughout. Feeling the pulse during chloroform inhalation is no guide whatever either to the blood pressure or to the one thing necessary for safety, which is to keep it regular; and it has been shown above that the pulse is of no value as a sign of approaching danger, since it is only affected dangerously (*a*) when the respiration has been interfered with, or (*b*) by an over-dose. Lastly, in order to keep the breathing regular, the whole of the administrator's attention must be concentrated upon this point alone; and it is therefore clear that if, as is now recommended in most of the text books, part of the chloroformist's attention is to be given to the pulse, an important element of danger comes into the administration.

At present, being in the wilds of the Rocky Mountains and amidst scenes of the "far west," I have not any means of referring to the pages of the *Record*, or to other literature bearing upon the subject. But at the earliest moment I hasten to place before the readers of the Journal, with which I was so long and happily associated, this doctrine of the action of chloroform, which, if not entirely new, is different from that which was generally accepted, even by the highest authorities, and also enunciated in the pages of the *Dental Record*. If I remember rightly it was the received opinion in Scotland, as well as that of Sir J. Y. Simpson, Mr. Syme, Sir J. Lister, &c., that death results from failure of respiration and not from syncope, and it was, therefore, of the utmost importance to watch with the greatest care the respiration alone, discarding the pulse, the pupil, &c. This, too, is the lesson urged by the Second Hyderabad Commission.

The question of anæsthesia by chloroform in dental operations has been discussed by the Odontological Society, and some years ago the consensus of opinion was that, owing to the high percentage of fatalities, chloroform should only be administered in exceptionally severe cases (in which nitrous

oxide or ether was not suitable), and then, by preference, at the patient's residence. Should the results and recommendations of the Second Hyderabad Commission be proved correct and satisfactory in experience, the data so gathered will necessitate the reconsideration of the queston by the dental profession.—*London Dental Record.*

Communications.

AMERICAN ACADEMY OF DENTAL SCIENCE.

Editor of the American Journal of Dental Science:

The Twenty Third annual meeting of the American Academy of Dental Science will be held in Boston, on Wednesday, November 12, 1890.

The annual address will be delivered by W. W. H. Thackston, M.D., D.D.S., of Farmville, Va.

EDWARD N. HARRIS, D.D.S.,
Cor. Secretary,
2 Park Square, Boston, Mass.

THE DENTAL PROTECTIVE ASSOCIATION.

Editor of the American Journal of Dental Science:

At a meeting of the Michigan Dental Association, the principal points in Dr. Crouse's remarks were:

First, that by continuing in some such an organization as the Dental Protective Association, we band the strength of ten thousand men into one. All defence necessary, can be made with but little more expense than would be required for an individual. The preparation of one case will

answer for all, all evidence can be collected better by an association than in any other way.

Second, that it is very important that all get into the association at this time, for the reason, that an appealed suit to the Supreme Court before the formation of the association, will probably be decided in favor of the Crown Company, owing to the deficiency in evidence and imperfect presentation. If the Crown Company win this suit they will send notices all over the United States, thereby demoralizing the profession and causing many to pay them money, who should be in the protective association, and thereby avoid that calamity.

The Protective Association will be ready with new evidence and a new record and can take care of its members against any claims of the Crown Company.

If you are not in the association the association will not take care of you when the time comes. If each man in the profession will pay $10 and assume a responsibility of ten more, without any further assessments, we will have an organization that is sure to break up all this abuse and save the dental profession an annual outlay, of, on an average of $100 each, to unjust claimants.

Remember it will cost more than $10 later to join, and will certainly cost more than that if you do not protect yourselves.

WM. CLELAND,
Sec'y Mich. Dental Asso'n.

Resolved, That the Michigan Dental Association, heartily approves the aim and plan of the Dental Protective Association and that it is further

Resolved, That it is the duty of every member of the dental profession in this State to join the Dental Protective Association.

It is also Resolved, That Dr. Crouse be requested to furnish the dental journals with an abstract of his remarks for publication.

W. H. DORRANCE,
W. D. SAUNDERS,
—— DOUGLASS,
Committee.

Editorial, Etc.

WE are greatly indebted to the "*Dental Cosmos*" for the advanced proof sheets of the proceedings of the National Association of Dental Faculties, and National Association of Dental Examiners, which appeard in the last issue of the JOURNAL.

AMERICAN DENTAL ASSOCIATION.—The Thirtieth Annual Meeting of this Association was held at Excelsior Springs, Missouri, beginning August 5, 1890. President: M. W. Foster, of Baltimore; Secretary; George H. Cushing, of Chicago.

After the call of the roll and the adoption of a resolution dispensing with the reading of the minutes Dr. Gardiner, of Chicago, precipitated a discussion by offering the following preamble and resolutions:

WHEREAS, There is to be a world's Columbian exposition in Chicago in 1893; and

WHEREAS, In consequence of the fact that the choicest products of the world are to be there displayed, it is expected that citizens in large numbers of all civilized countries will be gathered together there for the purpose of seeing these exhibits; and

WHEREAS, It is to be presumed that many dentists from foreign countries will visit the United States at that time; and

WHEREAS, The time of the exposition will be an opportunity for a great meeting of dentists of the world; and

WHEREAS, It is believed that a great advance in the science and practice of dental and oral surgery would re-

sult from a meeting of the dentists of the United States with those from foreign countries who might then be visiting this country; and

WHEREAS, it is desirable that any meeting then held should be at the instance of the American Dental Association and the Southern Dental Association, and organized by a joint committee by them appointed; therefore be it

RESOLVED, That the president of this Association appoints a committee of five, to confer with a like committee appointed by the Southern Dental Association at its last meeting upon this subject, and that this joint committee has power to fill all vacancies, and shall add to its membership either one, three, or five more members as it may deem advisable; and when this committee is so completed it shall be clothed with full power to take such action as it in its judgment may deem best for creating an organization for the purpose of holding a dental meeting in Chicago in 1893, which the reputable dentists throughout the world shall be invited to attend, and that any action that this committee may take in the premises shall be final and binding.

No sooner had this resolution been read than Dr. Allport, of Chicago, sprang to his feet and denounced it as a discourtesy if not a direct insult to the Southern Dental Association, whose committee was then on the floor awaiting an opportunity to submit a similar resolution. While he was in favor of co-operating with the Southern Association in the manner they had proposed, he would not consent to this discourteous method of procedure and moved to lay the resolution on the table to give the committee referred to an opportunity to perform its mission.

A spirited discussion then ensued and motions and counter-motions were made with amazing rapidity and amusing disregard of parliamentary law. The gentlemen participating in the fusilade were Dr. J. H. Thompson, of Topeka, Kas., who moved the adoption of the resolutions;

Dr. Allport, of Chicago, who moved to lay them on the table; Dr. J. A. Swazey, of Chicago, who moved a substitute; Dr. Truman of Baltimore, who moved a reference of the whole subject to a committee of three, with instructions to report; Dr. Stockton, of New Jersey, who wanted the whole matter settled right now; Dr. Brophy, of Chicago, who did not make his desires very clearly understood; Dr. Rhein, of New York, who objected to the plenary powers proposed to be conferred on the committee by the resolutions and therefore favored sending the whole subject to a committee to report; Dr. Patrick, of Belleville, whose interesting speech died in its birth, owing to the sudden and unexpected application of "the previous question," most cruelly moved by a doctor who was evidently anxious to close the debate, and Dr. Cushing, who, after the previous question had been voted, skillfully extricated the convention from the tangle into which it was getting by offering, and getting passed, a resolution to table the whole matter temporarily, so as to afford the committee of the Southern Association an opportunity to present the resolutions adopted by that body, which are, in substance, about the same as those offered by Dr. Gardiner.

Indeed, they are so nearly identical that Dr. Allport in his opposing speech, had denounced the presentation as stealing. The true inwardness of the debate came out afterwards in conversation, when the action of Dr. Gardiner was pronounced to be a sharp move on the part of a Chicago clique to obtain the chairmanship and, perhaps, the lion's share of representation on the proposed committee, to the exclusion of others who ought to have equal rights. The upshot of the affair was that when peace had been restored and some other business had been transacted, Dr. Carpenter, of Atlanta, Ga., chairman of the committee appointed by the Southern Dental Association, was called upon and submitted the resolutions of that body, which were read by the secretary, Dr. Cushing, and unanimously indorsed, except that Dr. Rhein, of New York, still adher-

ed to his objections to the absolute powers to be granted to the committee. The president was thereupon instructed to appoint a committee of five from the American Dental Association, to co-operate with the committee of the Southern Association, which committee will probably be named this evening.

A communication was read from the S. S. White Dental Manufacturing Company, of Philadelphia, which has the contract for publishing the transactions of the association, relating the history of the arrangement under which the publication is made and pointing out the benefits the association derived there-from.

This brought out Dr. Patrick, of Belleville, Ill, who most energetically denounced the Whites and the entire arrangement, objecting to the employment of a firm whose only interest in the association was that which a man would have in the contemplation of a turkey that he was about to devour for his Thanksgiving dinner.

Dr. Crouse, chairman of the executive committee, stated the reasons why he had, when chairman of the finance committe, made the publishing arrangement with the S. S. White Company, whose *Dental Cosmos* is the recognized organ of the dental profession in this country and the authority for the world. He showed how it had been formerly a great expense, one that could not be met without persistent begging, to obtain publication of the transactions of the association, whereas now they were not only saved this expense, but had always a balance of some thousands in the treasury. After some further unimportant debate, resolutions offered by Dr. H. A. Smith, of Cincinnati, indosing the present sytem of publication, were adopted.

The president then read the annual address which reviewed at length the dental laws of the various states, showed that all but five of the states and territories in the Union had such laws, and that nearly all of them differed

in essential features from each other. This led to great confusion and inconsistency in the requirements for those practicing dentistry in the different states, and would, if some means were not adopted to rectify the evil, lead to conflict and practical anarchy in the profession. He eloquently urged on the convention the necessity for considering the means for bringing about a conformity in the state dental laws throughout the Union, and made some cogent suggestions in that direction.

The dental laws were divided by the address into four classes—those that demand that both graduates and non-graduates shall be examined by state boards before admission to practice, those recognizing the diplomas of reputable schools and permitting the holders to practice to the exclusion of all others desiring the privilege, those demanding examinations but allowing the favor to graduates only, and those demanding examinations but giving exceptional clauses in favor of the holders of the medical degree. The different kinds of legislation were discussed by President Foster in an able manner. The president favored a unity of action between the state boards and the faculties of the dental colleges, and urged that diplomas which admitted the dentist to practice in one state should be recognized in the other states.

President Foster also urged that congress be petitioned to appoint with suitable rank and pay dentists in the army and navy wherever service of this nature may be required. Another clause recommended to the proper authorities the use of models taken from impressions of the mouth for the identification of criminals. He urged that the models would prove a valuable means of identification and suggested that they would also become a valuable source of study to the ethnologist and physiognomist.

The address contained still another clause recommending the establishment of a headquarters, dental museum and library of the association to be located at Washington.

The president of the association, continuing, said that he had confidence that the government would aid in the work, perhaps furnishing apartments in the Smithsonian Institution. In concluding his address President Foster referred to the thirty years of the association, the work that it has accomplished, the work that it is now doing and will probably do in the future.

At the evening session Dr. Foster, the president, announced the following committee to co-operate with the committee of the Southern Dental Association in preparing for the meeting of the dentists of the world, to be held in Chicago in 1893. Dr. Shepherd, of Boston; Dr. Walker, of New York; Dr. Hunter, of Iowa City; Dr. Noble, of Washington, and Dr. McElhany, of Columbus, Ga. A number of papers were read from section 5 and one by the venerable W. H. Atkinson, of New York, on "Dental Nomenclature."

AUGUST 6TH, WEDNESDAY.

The committee appointed on the first day, on arrangements, for a universal meeting of dentists during the World's Fair at Chicago in 1893, met at 8 A. M. as follows:

From the Southern Dental Association—Dr. J. Y. Crawford, of Nashville, Tenn.; Dr. John Storey, president Southern Dental Association, Dallas, Tex.; Dr. L. D. Carpenter, Atlanta, Ga.; Dr. Barton, Paris, Tex.; Dr. C. E. Stockton, Newark, N. J.; Dr. J. Taft, Cincinnati.

From the American Dental Association—Dr. L. D. Shephard, Boston; Dr. W. W. Walker, New York; Dr. L. D. Noble, Washington, D. C.; Dr. A. O. Hunt, Cincinnati; Dr. Marshall, Chicago; Dr. McElhaney, Augusta, Ga.

Elected at large—Dr. M. W. Foster, Baltimore; Dr. H. J. McKellops, St. Louis, and Dr. H. A. Harlan.

The committee then elected the following permanent officers: President, Dr. W. W. Walker, of New York; secretary, Dr. A. O. Hunt, of Cincinnati; treasurer, Dr.

Marshall, of Chicago. The great importance of this committee can be seen when the following clause, under which it has been created, is read: "And when this committee is so completed it shall be clothed with full power to take such action as it in its Judgment may deem best for creating an organization for the purpose of holding a dental meeting in Chicago in 1893, which the reputable dentists throughout the world shall be invited to attend, and that any action that this committee may take in the premises shall be final and binding."

The Association Proceedings for the second day were as follows: When President Foster had called the meeting to order he introduced the first vice president, Dr. A. W. Harlan, as the presiding officer of the day and work began forthwith. Prior to the meeting, however, expressions of regret were wired on behalf of the association to Dr. W. H. Morgan, of Nashville, Tenn., and Dr. E. T. Darby, of Philadelphia, who are prevented from attending the convention by sickness.

On the call of the sections, Dr. Peirce, chairman of the section on "Dental Education, Literature and Nomenclature," read a long and interesting report. The burden of his argument, as of all or nearly all the arguments being made here, was urging upon the convention the adoption of some means of raising the standard of dental education, and procuring uniformity in the various state laws. Charters were issued too readily to institutions calling themselves dental colleges, but which were established for revenue only, and with little or no regard to real, valuable dental education. He suggested that a committee of five should be appointed to consider and report, at the next annual meeting, upon the advisability of establishing a national board empowered to confer degrees on dentists of exceptional attainments. He animadverted on the comparative slenderness of the attendance, and particularly on the fact that the great bulk of delegates came from but a

few states. In support of this he stated that last night, before this morning's arrivals, there were seventy-five delegates from three states, while the other twenty-three only sent about 100 representatives. At the conclusion of the reading the report was handed in in company with papers that had been read in the same section by Dr. W. H. Atkinson, of New York; Dr. A. H. Thompson, of Topeka, Kas.; Dr. C. B. Atkinson, of New York, and Dr. Rodriquez Otto Lengui, of New York.

In compliance with a resolution offered at the close of Dr. Peirce's report, a committee of five, consisting of Dr. A. H. Thompson, of Topeka; Dr. J. Y. Crawford, of Nashville, Tenn.; Dr. C. N. Peirce, of Philadelphia; Dr. H. B. Noble, of Washington, D. C., and Dr. W. W. Walker, of New York, was appointed to consider and report upon those sections of President Foster's address which dealt with the unification of the state dental laws, the proposed employment of dentists in the United States army and navy, and the matter of scholastic education before matriculation of students in the dental colleges. Dr. J. W. Crouse, of Chicago, strenuously opposed the resolution to appoint this committee, on the ground that there had been too many resolutions and too many committees any way, with no appreciative results.

Debate then opened on the report of Dr. Peirce, which was participated in by Dr. H. B. Noble, of Washington, D. C.; Dr. E. Parmly Brown, of New York; Dr. C. S. Stockton, of New Jersey; Dr. A. W. Smith, of Kentucky; Dr. J. Y. Crawford of Tennessee; Dr. J. C. Story, of Dallas, Tex.; Dr. W. W. Allport, of Chicago; Dr. C. L. Goddard, of San Francisco; Dr. P. T. Smith, of Denver, and Dr. James Truman, of Philadelphia. At one time during the progress of the debate considerable heat was engendered by Dr. E. Parmly Brown, of New York, who criticized the dental laws of New Jersey very severely and said that "while he had been a practicing dentist in New York

city for thirty-five years he could not practice in New Jersey without being asked a lot of questions by a lot of boys whom he had picked up out of the gutter, given a dental education and set upon their feet."

This brought Dr. W. W. Walker, of New York, to his feet with a blunt contradiction of the picking-up-out-of-the-gutter remark, to which Dr. Brown replied that "for every one of the New Jersey examiners that Dr. Walker could show whom he had not picked up out of the gutter he, Dr. Brown, could show nine whom he had."

At this an unpleasant feeling was apparent till Dr. Stockton, of New Jersey, poured oil on the waters and in a temperate and rather skillful speech, set before the meeting the true meaning of the New Jersey dental laws, which were not such terrible affairs as Dr. E. Parmly Brown had supposed them to be. As the noon recess hour was approaching, Dr. J. W. Crouse, of Chicago, president of the Dental Protective Association, asked for and obtained a suspension of the rules for the purpose of offering a resolution for the appointment of a committee of four, one from each of the grand divisions of the country, to examine and report to the convention on the expenditures and accounts of the Dental Protective Association. This association is a special body organized to fight all bogus patents and defend all suits where its members are parties, and one of the principal matters to be investigated will be the standing and qualifications of the counsel employed for these purposes. The resolution was adopted and the chair appointed as the investigating committee Dr. C. L. Goddard, of San Francisco; Dr. J. Y. Crawford, of Nashville, Tenn.; Dr. W. W. Walker, of New York, and Dr. D. F. H. Gardiner, of Chicago.

Operative dentistry was the subject discussed at length last night and this morning. The report was made by Dr. N. S. Hoff of Michigan, secretary of section 3. The reports and papers presented by Dr. Atkinson, of New

York and Dr. Williams, of Boston, were extremely technical and dealt largely with cases and the best methods of treatment. The discussions were participated in by Dr. M. L. Rhein of New York, Dr. Harlan of Chicago, Dr. Stemmefield of Nashville, Dr. Brophy of Philadelphia, Dr. Conrad of St. Louis, Dr. Atkinson of New York, Dr. Patrick of Illinois, Dr. Storey of Texas, Dr. P. Browns of New York, Dr. Senaze of Chicago, Dr. Smith of Denver, Dr. Goddard of San Francisco, Dr. Crouse of Chicago, Dr. Crawford of Tennessee and Dr. Truman of Philadelphia.

Section 4 was, after some sharp discussion, passed until evening, to allow the secretary, Dr. W. X. Sudduth, to present a report. Section 4 is devoted to the study of histology and microscopy. Section 5, under the chairmanship of the president, Dr. A. W. Harlan of Chicago, presented a report upon materia medica and therapeutics. This report was, if possible, even more technical, and filled the average layman with more awe than any of the sections preceding it. The paper written by Dr. Harlan deprecated the use of carbolic acid by dentists. The report elicited no discussion, being evidently too deep for even the scientists present, and Chairman H. A. Smith of Cincinnati presented the report for section 6, devoted to the consideration of physiology and etiology. He presented a report upon the tabulation of prehistoric crania, referring to the recent action of the Illinois State Dental Association in starting the investigations of the skulls now in the museums of the country. The best method of labeling teeth was discussed by Dr. Patrick of Illinois who is to have charge of the work of compiling the returns from the museums of the country and Dr. Smith of Denver who has invented a system of dental notation which he claims gives excellent satisfaction. The convention was treated to a paper on systems of dental notation presented by Dr. How of Philadelphia. The discussion resulted in a resolution looking to

the unification of the systems of dental notation at the session of the dental congress at Chicago in 1893.

Section 7 was next called upon for its report. The report was presented by Dr. M. L. Rhein of New York. He read a paper on "Alveolal Abscess." The paper was written by Dr. C. Hugenschmidt of Paris, France, and was listened to with interest and attention. Dr. Rhein, a specialist in cases of this nature, then presented a paper on "Alveolal Abscess" which showed great depth of scientific research and was heartily applauded by the convention. After sending a cablegram of congratulations to the International Dental Association now in session in Berlin the convention adjourned until evening.

At the night session the association officers for the ensuing year were chosen as follows: Dr. A. W. Harlan, Chicago, president; Dr. J. D. Patterson, Kansas City, first vice president; Dr. H. B. Noble, Washington, D. C., second vice president; Dr. J. H. Cushing, Chicago, recording secretary; Dr. Fred. A. Levy, Orange, N. J., corresponding secretary; Dr. A. H. Fuller, St. Louis, treasurer.

The time after the election of officers, was devoted to papers illustrated by magic lanters. The paper upon the blood supply of the teeth was presented by Dr. A. O. Hunt of Iowa City, Ia.; the paper upon oral tumors was presented by Dr. W. X. Sudduth of Minneapolis, Minn. At the close of the evening session a full dress ball was given under the direction of Prof. Scard at the parlors of The Elms. The party in honor of the dentists was greatly appreciated and enjoyed by all.

The first lady elected member of the American Dental Association was admitted to day. The lady is Mrs. Emma Eames Chase, daughter of the distinguished doctor and dentist, W. Eames of St. Louis, Mo., and wife of Mr. Harry Chase, the distinguished marine painter, recently deceased. Mrs. Chase is practicing with her father in an

office in St. Louis and has acquired considerable reputation as a dentist, writer and artist.

At the meeting of the association last night the question of the place of meeting was left in the hands of the committee of arrangements.

AUGUST 7TH, THURSDAY.

Vice President Harlan presided at the session this morning. Dr. C. N. Pierce, chairman of section No. 2, presented the report upon dental education. The present number of colleges teaching dentistry in the United States was stated to be thirty-three. From these schools last year 963 persons graduated. The total number of graduates from 1886 to 1890 was fixed at 3,605. Dr. Pierce compared the rapid growth in the number of dental graduates to the remarkable increase in the number of graduates of medical schools, an increase that has made the medical profession of the United States the wonder and surprise of the world. He thought the three years' course to be a step in the right direction and insisted that state boards to examine the graduates are an absolute necessity, in view of the present condition of things.

A resolution favoring the unification of the state laws in regard to dental practitioners and asking for the appointment of a committee of five, to report at the next meeting, carried unanimously.

Telegrams of condolence were sent to Dr. W. H. Morgan of Nashville, Tenn., and Dr. E. T. Darby of Philadelphia. Both of the gentlemen were former presidents of the association and both are seriously ill at the present time.

The discussion of the papers presented by section 2, upon the subject of dental education, was lengthy and not always to the point. Perhaps the best address was that made by Dr. Truman of Philadelphia. He held that the present stage of dental education is largely transitional, the

passing from a period without law to a period when the profession and the people are to be injured by the law. A quarter of a century's work as an educator has convinced Dr. Truman that there are radical defects in the present methods of teaching. He favored more of the practical, less of the didactic, more of demonstrations, less of lectures. He thought the true method in the government of dental colleges would be to aim for liberality of action as well as unity of action. He thought a little more encouragement, a little less criticism for the dental schools of the country would be a benefit in many ways.

Dr. Noble of Washington, D. C., told of the methods employed and the work accomplished for years in trying to get congress to pass a dental law for the District of Columbia and the territories. The committee had labored in the face of the greatest discouragements, sometimes getting the measure through one house of congress, sometimes through the other. He had been assured by Senator McMillan of Michigan that the bill would undoubtedly pass this year. Dr. Brown of New York objected to the different laws in the different states. He objected to the laws of New Jersey because they require dentists, no matter how high their standing, to undergo an examination. He thought it hardly right that a man of years of practice and a reputation extending all over the country should be placed upon the level with recent graduates from the different schools. Dr. Stockton came to the rescue of the New Jersey law. While it might be a little severe in the letter it would prove all right in the spirit and the application, since no board of examiners would be likely to refuse men of Dr. Brown's standing the right to practice. He thought that the law would work well in the long run and insisted that the New Jersey association be ranked among the very first in the land.

Dr. A. W. Smith of Kentucky favored simplicity in legislation. He thought that the line of demarcation ought

to be drawn between the true dentist and the poor one without a long preamble. Dr. Crawford of Tennessee in an eloquent speech argued in favor of simplicity, generosity and justice in matters of legislation. The violation of the code of ethics should be punished. As for having too many dentists worthy of the name in the country, Dr. Crawford thought it not possible. Dr. Story of Texas, in a graphic and humorous address, pointed out the dangers and difficulties witnessed in his state in securing and enforcing dental laws. Time should not be a requisite for granting a diploma. Knowledge should be the only requisite. The standard should be placed high, but a diploma should be a passport to the profession and a man holding a diploma should be allowed to practice. Dr. Alport believed that diplomas should be passports, but unfortunately they were not because of the low order of some of the schools. Dr. Goddard explained the workings of the California laws governing schools and graduates. Dr. Smith favored moral suasion and the elevation of the profession by study and hard work.

Dr. J. W. Crouse of Chicago succeeded in obtaining the floor for a few minutes. He made an earnest plea for the dental protective association, urging that it had saved members of the profession half a million dollars by preventing manufacturing establishments invented by members of the profession from obtaining patents on inventions designed by the inventors for the common good of all. After listening to the address the convention adjourned for dinner. The afternoon was spent in committee meetings. At the evening session the subject of dental education, as reported in section No. 2, was again taken up by the convention.

AUGUST 8TH., FRIDAY.

There was merely nothing performed this morning. Most of the dentists were scattered over the grounds or

enjoying themselves on the veranda of The Elms hotel. One and all speak in the very highest terms of Excelsior Springs and the splendid accommodations and courteous treatment they have experienced. Last night at an impromtu jollification given by the newly elected president, Dr. Harlan, after the close of the dress ball given in their honor in The Elms dining room, Dr. Truman, of Philadelphia, voiced the sentiments of the entire body. He said, in response to the toast proposed by Dr. W. W. Walker of New York, that last year, when the convention met at Saratoga and they had met with several disappointments, the cry had been excelsior. They looked to the future to bring the better things, and they had found better things, at Excelsior Springs. Many of them had thought that in coming into a part of the country which many Eastern people still consider wild and lawless they would have to put up with many discomforts. Instead of this, they had found greater comfort, better hotel accommodations and more liberal and courteous treatment than at any place they had met in all the years of their organization and existence as an association. There was no exception to this broad assertion that could be sustained, and, for his part he should depart with the liveliest feelings of satisfaction with The Elms, the springs, the lovely scenery and the kindly treatment extended to them by the managers of the Excelsior Springs Company.

Other speeches followed, all in the same strain of eulogy, and before the convention adjourned, by way of giving official expression to the feeling, the following preamble and resolutions were entered of record on the secretary's books:

"During the first week in August the American Dental Association, the National Association of Dental Examiners, the National Association of Dental Faculties and the Dental Protective Association, associated with whom were many members of the Southern Dental Association, by way

of expressing their several and collective opinions of the admirable treatment they all received at the hands of the Excelsion Springs Company's managers, and their appreciation of the excellence of The Elms hotel, have caused the following resolution to be offered at a meeting of theAmerican Dental Association and the same was passed unanimously:

"RESOLVED, That in selecting Excelsior Springs, Mo., as the place for holding our thirteenth annual meeting this association has been particularly fortunate. Whether we regard the beauties of the surroundings, the variety of health giving waters, the excellence of the hotel or the courteous, liberal and accommodating spirit of the company's manager's, we can especially recommend Excelsior Springs, Mo., as a desirable place for holding literary and scientific conventions and as possessing unusual advantages as a health and pleasure resort."

IDENTIFICATION BY THE TEETH.—On the 21st of July last a dead body was found floating in the Potomac river above Georgetown, D. C. About one week previous, Charles C. Andrews, formerly of Baltimore City, but at the time living in Washington, D. C., disappeared from his home and had not been seen since that time. A few days ago the body found in the Potomac was identified by Dr. T. W. Coyle, a practicing dentist of Baltimore, as that of Mr. Andrews by the dental work done by Dr. Coyle, in June 1876. The following is the record of the dental work and a history of the case:

Mrs. Andrews, wife of the missing man, went to Dr. Coyle's office, 825 North Eutaw Street, and asked that he go over to Washington to examine the body of the man found on July 21, and see if he could recognize it. It was impossible at that time for Dr. Coyle to go, and yesterday Frank Andrews brother of the missing man, Detective McDevitt, of Washington, the representative of an insurance association, and two

others, took to Dr. Coyl's office the skull of the drowned man. As soon as he looked at the jaws he recognized the skull as that of Charles C. Andrews by the fillings he had put in the teeth fourteen years ago, when Andrews was a young man of twenty-four. The greater part of the work was done on June 26, 1876. At that time, and subsequently, Dr. Coyle inserted in the upper jaw of Andrews a filling in a crown cavity in the right twelve-year-old molar, an approximal cavity in the right lateral incisor, a lateral approximal cavity in the left eye tooth, a crown cavity in the left posterior bicuspid and a crown cavity in the left wisdom tooth. He extracted three of the front teeth, one right anterior bicuspid, and there were teeth on the left side out, a molar and two bicuspids. He made a set of seven false teeth on a rubber plate all for the upper jaw. In the lower jaw he filled a number of teeth which he remembered. All of these fillings were of gold except the last which was of amalgam. The set of false teeth were gone, as was the left eye tooth in the upper jaw. The loss of this tooth was due to the handling of the body, the examinations that have been made &c. One of the men present, who saw the body when found says the tooth was in its place then. Dr. Coyle rummaged among a lot of his old books and at last found that containing some of the accounts of his patients for the year in which he did work for Andrews. Over Andrews's account were exact diagrams of his mouth and of the work Dr. Coyle had done for him. Every one present was perfectly satisfied after Dr. Coyle had explained the diagrams that the head was that of Andrews, and Dr. Coyle says he is willing to make oath to it before any court in the land. He is satisfied that the body could have been identified in no other way. All the fillings were in place, as sound and solid almost as the day they were put in. When the body was found in the Potomac, near Georgetown, D. C., it was entirely nude, and no trace of clothing has yet been found. It was buried in the almshouse cemetery, it was exhumed once after that for identification, then reinterred, and then within the last day or so exhumed again in order that the skull might be brought to Dr. Coyle. Mrs. Andrews has claimed the body, which will now be prepared for burial again and brought to Baltimore and interred in

Bonne Brae Cemetry on Saturday. Mrs. Andrews is now perfectly satisfied that the body is that of her husband. She believed it to be for some time past, though she could not identify it because of decomposition. The police, who are investigating the mystery of his death, are as yet without clue.

An article in the Baltimore *Daily Sun* relating to questions of "dental jurisprudence," contains the following:

The remarkable identification of the body of Charles C. Andrews by Dr. T. W. Coyle, the Baltimore dentist, after the finding of the body in such a condition of nudity and decomposition that identity was not possible by ordinary means revives the question of dental jurisprudence. It was in 18[illegible] that Richard Grady, M.D., D.D.S., made a plea before the Maryland and District of Columbia Dental Association that "Dental jurisprudence should have not only a name, but a local habitation." In Baltimore, the oldest and most widely known American centre of dental learning, has occurred the most striking evidences of the value of dental jurisprudence, not alone in the Andrews identification, but Dr. Grady showed in the Goss-Udderzook murder case. The Doctor noted in his paper twenty cases of personal identity that were established by the teeth, some of which have a local interest here.

His paper says: "The Goss-Udderzook tragedy was a double story of fraud in the earlier stage and murder in the later. February 3, 1872, a newspaper stated that W. S. Goss, living at 314 North Eutaw St., had been burned to death in a cottage outside of Baltimore the previous night. The remains of a human body were taken from the building. The lower limbs were destroyed, and the features were so burned or charred as to be beyond recognition. From the shape of the chest, neck and head the corpse was identified to be that of W. S. Goss, so the coroner's jury rendered a verdict that W. S. Goss came to his death by the explosion of an oil lamp. The body was buried at Baltimore Cemetry. The widow had no question but that it was that of her husband, as she knew the contour of the neck, head and breast. Ten or more witnesses testified to their belief in the some identity.

"In May, 1871, W. S. Goss had seemed to be seized with a sudden mania for insuring his life. He had insurance amounting to $25.000 payable to his wife. The stories of Wm. E. Udderzook, a brother-in-law of Goss, cenveyed the the impression that he knew too much and led the insurance company into an inquiry. There was nothing in the way of a direct demonstration to show fraud. Mrs. Goss was asked to make an elaborate description of her husband's teeth which she said were solid, sound and regular. She said that during the fourteen years she had lived with him he had had no pain from his teeth and had not required the services of a dentist.

"The remains were exhumed and examined in the Baltimore College of Dental Surgery, and Prof F. J. S. Gorgas wrote a report and modeled plaster casts of the jaws, showing that the buried man must have had teeth drawn frequently by a dentist, and that his teeth could never have been truthfully called regular and sound. In a trial in which the companies attempted to prove that the body found was not that of Goss, Dr. Robert Arthur testified that the plaster model of the subjects mouth, made by Dr. Gorgas, showed much disease, and much pain had been suffered. The jury returned a verdict on June 26, 1878. for Mrs. Goss for the amount of insurance, with interest. On July 1 or 2 the body of Goss, who, had been murdered, was found in Chester county, Pa., after Udderzook had been with him. The description of the body included the teeth, and Udderzook was convicted of murder in the first degree."

Another case is that of Miss May Hatch, given as follows: "Miss Hatch, of Baltimore, went to Norfolk, Va., June 16, 1888. There she took the steamer for Boston, and when on the ocean it is claimed committed suicide by drowning. To perfectly establish the identity of the remains Dr. Norris, of Baltimore, examined the teeth, and comparison with his diagrams left no doubt regarding the identity of the corpse." In addition to these cases are cited the identification of C. Arthur Preller, the victim of the St. Louis trunk mystery, and that of the Prince Imperial of France, who was killed in Africa.

Monthly Summary.

MYSTERIES OF THE NERVES.—A PROBLEM THAT PUZZLES MEN OF SCIENCE.—"When we find out the secret of the nerves we shall probably have discovered the secret of life. We shall then perhaps know something of the soul, whose very existence is now disputed, and we shall be able to formulate some definite opinion in regard to immortality. Science is slowly moving onward towards that point, says the San Francisco *Chronicle*, and seems at times to have some clue to the mystery. Then the scientists are all at sea again and all becomes dark as before. The study of physiology, physical and mental, is little more than a study of the nerves, simply because the nerves are intimately connected with health of body and mind. In cases of prolonged disease, as long as the nervous system is not completely shattered there is hope. Nervous and delicate men and women pass safely through the epidemics that carry off strong and healthy persons by the thousands. When the nerves refuse to act, the will, which is the resident power in the human being, ceases to act also, and death finds an easy prey. There are persons attacked with what seems to be a mortal disorder who obstinately refuse to die. A certain amount of nervous force comes to their relief, which acts on the physical functions and brings back the prostrate individual seemingly from the gates of death.

Sometimes this restoration of sick persons to health seems like a miracle, and there is little doubt that many so-called miracles have been the result of an affluence of nervous force coming from a sudden excess of hope or shock to the system, eminating from no matter what source. Did the alleged saints in the first centuries of the Christian era ever cure the sick? Was a sick man ever restored to health by the touch of a king in the time when kings were thought to rule by divine right? Was there ever such a thing as a faith cure?

Who will undertake to say that cures have not been performed by each of these means? And yet if it were so, it is not necessary to suppose that there was any occult power in either saint, king or appostle of faith cure. The whole secret lay in the psychological state of the sick person, in whom confidence in the means and hope, combined with latent nervous force, conspired to set the vital functions again in motion.

The pathological phase is only the borderland of the mysterious subject. On the phenomena of the nerves magnetism, spiritism and hypnotism have erected systems and theories involving a host of strange illusions, but conveying also scientific facts of supreme value. A spirit medium is only a being endowed with exceedingly sensitive nerves. A nervous subject may be hysteric, epileptic, or the victim of hallucinations or impulses of various kinds, which result in eccentric actions or abnormal physical conditions. The nervous system of some of these persons is in such an excessively morbid state that external sensation, such as a sudden noise, the ticking of a watch, a pressure on the body, contact with a warm or cold body, a breath, a ray of light, the reflection from some bright object, suspends animation. The subject falls into a sleep which lasts for a longer or shorter time, and wakes to forget everything that has passed during this period, though it may have filled with acts and incidents and may have continued several weeks. The Witch of Endor was probably a mere bundle of nerves—a sort of spirit medium of Bible times. The pythoness of Delphi was a hysteric or epileptic capable of extreme nervous exaltation. The witches and scorcerers of the middle ages were, in many cases, the victims of nervous attacks, which those about them and they themselves sincerely believed to be caused by divine or demoniac inspiration. In the light of modern science these characters and events are seen in a less mysterious light.

Similar things happen in injuries to the brain, in cases of hysteria, and even in somnambulism. Even the ordinary dreamer recalls in a dream what he has seemed to see in a former dream, though he may never have remembered it in his waking moments. It is not, perhaps, for this reason the less

remarkable, for sleep with its active brain, its thoughts and its visions, remains and may always remain one of the mysteries of existence. To the doctors all these things indicate disease. Dreams are the result of an imperfect digestion. The subjugation of one person to another's will, the dual state in one of which the subject seems on the confines of another world, is caused by a disorganized nervous system. Even genius, especially poet genius, is stigmatized as an unhealthy psychological state. Everything that is not the dullest and plainest prose of life seems in the process of being transformed into morbid conditions of the body. Does it render a phenomenon less mysterious to prove that it is physical? An object falls to the ground by the law of gravitation. Do we understand that marvelous law better because we constantly see its operation? Chemical atoms attract or repel one another in virtue of a universal law of whose hidden force and meaning we have not the remotest conception. But we are consoled when we discover that something in nature falls within the domain of natural. The phenomenon is classified, but has by no means ceased to be a mystery."

LISTERINE.—According to Fortshutt the following is a preparation very similar to listerine:

R.	Ac. benzoic	
	Soda biborate	aa gum. 8.
	Ac. boric	gms. 16.
	Thymol	gm. 2.4
	Eucalyptus	
	Ol. gaultheri	aa gtt. 10.
	Ol. menth	gtt. 6.
	Ol. thyme	gutt. 2.
	Rect. spirit	gms. 180.
	Aqua qs. ad	gms. 1000

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ARTICLE I.

ON THE DANGERS ARISING FROM SYPHILIS IN THE PRACTICE OF DENTISTRY.

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Read before the New York Odontological Society, April, 1890.

Happily the recorded instances of the communication of syphilis in connection with the practice of dentistry are relatively few in number when compared with the very numerous cases on record where the disease has been acquired through other innocent channels; for, it must be remarked, the number and variety of modes by which this disease has been spread innocently from one person to another, entirely without sexual transgression, is manifold greater than could be supposed or imagined by one who has not investigated or given some attention to the matter.

The subject of the innocent transmission of syphilis is a very large one, and one to which the public health offi-

cials might well direct their attention; but the present time we can consider only a very small and limited subdivision of it,—namely, as the existence of the disease may in any way bring danger through or to any one in the practice of a single branch or specialty in surgery,—that of dentistry.

Although, as before stated, the reported instances where syphilis has been communicated in connection with, or during the operations of dentistry, are relatively few, nevertheless, there are a sufficient number of cases on record not only to show clearly that this unfortunate accident has repeatedly occurred, and may readily happen, but also to direct our attention to the methods or channels through which this may take place, and so to indicate the means by which the danger may be escaped or avoided. To develop these points will be our task this evening.

It would be quite out of place in this assembly to attempt fully any consideration of syphilis as a disease, or even to give a description of its different manifestations and effects, which are more varied and manifold than those of any other known malady. But before entering upon our subject proper, it may be well to briefly recapitulate the points which are well established in regard to the nature and pathology of syphilis, in order that the real dangers arising from the disease may be better understood, with the reasons therefor.

Syphilis is no longer to be looked upon with the utter abhorrence with which it has been regarded in times past, when it was always believed to be the result of sexual transgressions; it is not, indeed, to be considered always as a venereal disease, for advancing knowledge has revealed, and science recorded, thousands of cases where it has been acquired in scores of ways, where the unfortunate victim was as innocent as is one who catches small-pox, scarlatina, or measles; but, of course, the fact still remains that in the enormous majority of instances syphilis is acquired in sexual intercourse, because here is offered the

greatest opportunity for abrasions to occur, through which the poison may gain entrance. But, on the other hand, hundreds, or even thousands, of physicians themselves and midwives, have contracted syphilis in the practice of their calling; in numbers of instances it has been conveyed in vaccination, tattooing, cupping, and breast-drawing, and, in fine, there is no end to the curious and previously-unexpected methods by means of which this disease has been innocently communicated from one person to another.

This innocent transmission of syphilis has also occasionally happened in the practice of the various departments of medicine and surgery. Not only have midwives acquired the disease in the practice of their calling, but several small epidemics are on record where a number of women, and from them their children and others, have acquired syphilis from a chancre on the finger of the woman who had delivered them. The disease has also been communicated in various surgical operations, and a striking illustration is found in the history of Eustachian catheterization, where as many as sixty cases were traced to the practice of one person. Instances will be given later where it has occurred in some of the operations of dentistry.

Syphilis is a well-defined disease, depending always upon the entrance of a definite, specific poison, which has never been perfectly isolated, and of whose exact nature we know nothing. It is most probably due to a micro-organism, but although this has been thought to be discovered on several occasions, it has never been satisfactorily demonstrated, nor have inoculations been made with success by any pure cultivation of the same. It suffices for our purpose, however, to recognize that there is a poison, capable of entering the system, and thereby causing syphilis, which can reproduce or multiply itself there, and again, under proper conditions, communicate the disease to all who are properly and sufficiently exposed to its influence.

The poison always enters the system at some definite point, and at this place, generally within from two to four weeks, a local sore, termed a chancre, develops, which is the first external sign of the syphilitic invasion. This sore presents quite different appearances under different circumstances and in various localities, and time fails to attempt to describe these; their appearances may be learned from many recent text-books and journal articles. The only exception to this mode of entrance of the disease is found in the case of hereditary syphilis, where the poison enters with the life, and possibly in some other rare conditions, which need not be entered upon here.

For the entrance of the syphilitic virus a broken epithelial or epidermal surface is necessary, although apparent exceptions to this rule have been occasionally met with. But in some way the poison must come in contact with the absorbing elements of the body,—either blood vessels or lymphatics,—and by them be taken into the circulation, where it multiplies and produces lesions in various parts of the body, and then probably increases also in the tissues. When once the virus has gained entrance, the individual is syphilitic, and unless the disease is checked by treatment, it will go on to produce, its manifestations, even for many years.

The period during which syphilis is actively inoculable has never been definitely determined, and will probably never be accurately known. It is certainly very contagious, under proper circumstances, during the first year, and also for many months thereafter, and cases are on record where infection has occurred from cases many years advanced in syphilis; indeed, the point or period has never been determined when danger ceases. Although it is questionable if syphilis is often communicated by patients five years after their infection, no prudent man would ever take a shadow of a chance of personal inoculation at this or even at a very much later period. Treatment, of course, greatly modifies the infective power of the disease, and under the

fullest possible measure of proper treatment the contagious character of syphilis is greatly lessened, if not entirely destroyed, in some cases, even in the earlier stages of the disease. But all these "ifs" and qualifying statements only show what a dangerous and treacherous affection we have to deal with, and how difficult it is always to be certain of immunity from danger.

The poison of syphilis may be received from four different sources,—1, the initial sore or chancre; 2, from mucous patches; 3, from syphilitic ulcerations; and 4, from the blood. These we will briefly consider in above order.

1. The chancre, or initial sore of syphilis, is occasionally found upon the lips, tongue, and other portions of the buccal cavity, but generally the lesion is so marked and painful that the patient avoids the dentist, and there is relatively little danger of infection from this source. But, on the other hand, this danger sometimes occurs, as in the instance of the case which fell under my own observation, about to be described, where the gentleman, supposing that the chancre was only a local sore, due to sharp and rough teeth, went to his own dentist, and had them filed off, even when the ulcer was very painful and giving off an abundant, virulently contagious secretion; so that his dentist must certainly have been exposed to the same. It is well, therefore, in the case of doubtful sores about the lips, tongue, or mouth, either to be assured of their harmless nature or to exercise such precautions as will insure perfect protection to self and others, which will be considered later.

2. The second source of the contagion of syphilis—namely, mucous patches—is far more fruitful of infection, and that against which special care must be exercised. It is to be remembered that at one time or another these lesions appear in a greater or less amount on the buccal mucous membrane of almost every case of syphilis, so that at some moment or other almost every case is capable of communicating the disease from this source of contagion.

Mucous patches are slightly raw surfaces, of various sizes and shapes, which are at first elevated slightly, and then may become depressed by the loss of the epithelial covering. When newly developed, they are of a redder color than the normal mucous membrane, but later may become of a grayish white. They are always superficial lesions, and often do not cause much annoyance, so that the patient may readily attend to all the duties of life, and may go through considerable dental manipulation while having an abundant crop of mucous patches on the tongue, lips, or buccal cavity. The secretion from them is sticky and intensely contagious. It is from these lesions that fresh chancres are most commonly contracted, and it is this secretion which, adhering to instruments and articles of use or convenience,—such as cups, spoons, pipes, etc.,—commonly gives rise to syphilis in most unexpected manners.

3. Certain deeper ulcerations of syphilis may sometimes give rise to contagion, especially when they occur in the earlier stages of the disease; but practically very few instances of contagion are ever from this source, although this danger should always be guarded against as well.

4. The fourth source of syphilitic infection—namely, the blood—is the least likely to present dangers in connection with dentistry. It is, however, quite possible for blood, which is drawn during an operation or by accident, to communicate syphilis, if it chances to find a proper opportunity to enter another individual. It is just the uncertainty in regard to the possibilities of infection which gives to our subject such great practical interest. In few, if any, of the dozens of methods by which the disease has been innocently transmitted from one person to the other was the possibility of such an accident known, or even suspected, beforehand.

We will now consider some of the observed facts in regard to the communication of syphilis in dentistry, and afterwards examine the modes of transmission and the

means of prevention. Our clinical study will naturally divide itself into two lines of thought,—1, in regard to the dangers from syphilis to *patients* undergoing dental operations; and 2, in regard to dangers to the *operator* from the same source.

1. First as to dangers to the *patient* from exposure to the syphilitic poison during dental operations.

Inasmuch as it presents many points of interest, relating both to the patient and operator, I may be allowed first to recite the case alluded to, which came under my own observation and treatment, and which first called my attention particularly to the subject.

Mr. X. W., a gentleman of intelligence and position, aged 60 years, came to me September 11, 1884, on account of a sore on the tongue, which he feared to be a cancer. The history was, that some ten weeks before his first visit, he had first noticed a little point of soreness, which had gradually increased in size, in spite of treatment, until latterly it had come to give him considerable annoyance, so that he was conscious of its presence at all times; the true nature of the sore had evidently not been recognized.

On examination, there was found on the right side of the tongue, about an inch from its tip, a hard, inflamed mass, nearly half an inch in diameter, the centre ulcerating and the edges somewhat everted; it was not painful except when irritating food or drink touched it. The two upper molars were found to have sharp and rough edges, and he had been wearing a red rubber plate until recently. There was a small and painful gland beneath the jaw on that side, slightly enlarged.

Thinking that the ulcer might possibly be due to irritating local causes, he was given a soothing mouth-wash, and an alkali internally. Five days later there was a marked improvement in its condition; the ulcer had a less angry look, but its edge was more clearly defined as the inflammatory element had somewhat subsided. He had

been, of his own accord, to his regular dentist, and had had the roughened teeth made smooth, and had left out his set of artificial teeth.

From a careful second study of the case, I then felt convinced that the sore was a chancre, a primary lesion of syphilis, and he was immediately put on antisyphilitic treatment; the general eruption and other symptoms which followed a few weeks later rendered the diagnosis certain, together with the remarkable manner in which the sore healed and symptoms vanished under the proper treatment for syphilis.

In searching for the mode by which the syphilitic poison had gained entrance, it was learned that, during the month or so previous to the appearance of the sore upon the tongue, he had, through the persuasion of a friend, been under the care of a dentist of the cheaper, advertising order, who, he had noticed, was not at all cleanly either in his person or with his instruments. He could not locate the exact date of the injury of the tongue by the dental instruments, but work had been done in that locality, and he remembered the instrument occasionally slipping, as will often happen, inflicting injury to the soft parts. He was a married man with a family, and was very desirous of learning how he had become infected; he had certainly not been exposed in sexual intercourse, nor in any other manner which we could discover.

The interesting points in the case are: First, that while the proof is not absolute that he was infected in the dentist's chair, still the circumstantial evidence is so strong that little if any doubt can be entertained that the poison came through this channel. The habits and ways of the particular dentist were such that poisonous material from the mouth of a previous syphilitic patient could readily have been transferred on instruments or otherwise to the wound made in the tongue, either by the sharp teeth or by a slip of an instrument. The second interesting point is

that this patient, before the true nature of the disease was ascertained, had been to his own regular dentist for smoothing the teeth, and so had certainly exposed him, and others through him, to the poison, which was secreted freely from the raw surface of the chancre.

The earliest recorded cases of the transmission of syphilis in dental operations are in connection with the transplantation of teeth, during the last quarter of the eighteenth century.

Sir William Watson * published a case of this description, and John Hunter † relates two similar cases about which there can be no doubt. J. C. Lettsom ‡ also recorded three cases: of these one was personal, one seen by a Dr. Hamilton, and the third occurred in America, having been observed by Kuhn in Philadelphia; these gentlemen furnished notes of the cases to Dr. Lettsom. This mode of transmission does not occur again in Literature, to the knowledge of the writer, although Gibier § says that "Cases have been recently related." In view, however, of a recent revival of the operation of tooth transplantation, or implantation, it is quite possible that the future may furnish fresh instances of this mode of the innocent acquiring of syphilis.

From this period no other causes of the transmission of syphilis through dental procedures are found recorded for nearly a century; indeed, not until the advent of modern operative dentistry and active medical observation.

The first case met with is one reported by Dr. C. W. Dulles, * of Philadelphia, and which was also seen by the late Dr. Maury. The patient, a female domestic, of excellent character, developed a chancre of the lip two weeks

* Watson, "Transactions of College Surgeons," 1785, iii. p. 328.
† Hunter, "Treatise on the Venereal Disease," 1st Engl. ed., 1786; 1st Amer. ed., Phila., 1818, p. 362.
‡ Lettsom, *Transactions Lon. Med. Soc.*, vol. i., 1787, p. 137.
§ Gibier, "Ann. de Dermat. et de Syph.," 1882, p. 129.
* Dulles, *Phila Med. and Surg. Reporter*, Jan. 1878.

after a visit to a dentist; on that occasion he extracted a tooth, and later did some cleansing of the teeth. Although no confirmation was obtained, it seemed reasonable to suppose that the operation of extraction was in some way responsible for the inoculation.

Dr. F. N. Otis † also mentions a chancre of the lip which occurred in a gentleman "about three weeks after a morning spent in a dentist's chair."

Lancereaux ‡ relates a similar case of chancre of the lower lip in a woman, after extraction of a tooth and other dental work, and Giovannini, § of Bologna, has reported a chancre of the lip apparently from a dentist's instrument.

Leloir * mentions having seen a man with chancre of the gum, in whom the infection seemed to have taken place in consequence of cleaning and filling a cavity in a tooth with soiled instruments. Lydston † has likewise reported the case of a woman with syphilis, in whom the chancre on the gum, below the lower middle incisors appeared to be the result of some cleaning and repairing of the teeth done three weeks previously; the glands beneath the jaw were enlarged, beginning a week or more after the appearance of the sore on the gum.—*International Dental Journal.*

ARTICLE II.

THE HYPNOTISM CRAZE AND ITS DANGERS.

Hypnotism, which is now at the height of fashion, is nothing more than a new edition of the threadbare practice of mesmerism somewhat revised, enlarged and greatly im-

† Otis, "Lectures on Syphilis," New York, 1881, p. 102.
‡ Lancereaux, "Proc. Acad. de Med. de Paris," *Union Med.*, 1889, xlviii. p. 655.
§ Giovannini, "Le Sperimentale," 1889, p. 262.
* Leloir, "Lecon sur la Syphilis," 1886, p. 62.
† Lydston, *Journ. Amer. Med. Assoc.*, 1886, vi. p. 654.

proved. It is strange that the medical profession should go wild over an idea so old. Our grandfathers can tell us more about the mesmerism of their young days than we know of it know under its new name, "hypnotism." The recent agitation was principally indulged in by the French physicians up to a quite late date when the epidemic crossed the Atlantic and pervaded the minds of the more superficial physicians who are fond of bluster and excitement. If we take a retrospective view of the recent past we will find the same element in this country indulging in hypnotism that made such a painful exhibition of themselves over the "Brown-Sequard elixir of life" fraud. At the meeting of the British Medical Association at Leeds, England, last summer, we were annoyed by a couple of supercilious nabobs from Paris who persisted in reading lengthy papers on this subject, much to the disgust of the members of the association. We little expected that our more reasonable American profession would run mad over a practice so well known and so little used. We were mistaken. The folly has fully asserted itself and we are obliged to endure its ephemeral consequence notwithstanding any protest we may make. Like the doctrine of Christian Science there is enough virtue in it to be annoying. In fact it covers about the same ground and accomplishes the same work as the devotees of Christian Science, but in a little different way. There is enough truth in both practices to make them dangerous; the one to the individual who is susceptible to the influence, and the other to life in cases where a pathological condition exists; neither practice being adapted to diseased conditions. Hypnotism or mesmerism presents dangerous phenomena, which concerns the public as well as the subject under the influence, and now that much interest is being manifested in the singular effect of the so-called science, those susceptible to influences of this kind are proportionally easily brought under the effect, just as any hysterical person may be thrown into hysteria by frequent renewal of the exciting cause. There

is a peculiarity about any person that can be hypnotized. This peculiarity is confined to the nervous system and closely related to that developed in hysteria. It is quite probable that hypnotism is but a form of hysteria, and that a case of hysteria can be relieved by hypnotism much more readily than by medicines. We have no doubt but that the Christian Scientist can treat hysteria more successfully than the skillful physician.

There are but few people susceptible of being hypnotized, and those who are can be brought under that state as well by one person as by another, and while hypnotism may be used with advantage in dispelling delusions in hysterical women, and for the cure of hysterical pain and other imaginary ailments, it becomes dangerous in such cases in the hands of unscrupulous persons. The social danger is the one most to be feared. Crimes may be committed under its influence, even the mind may become unbalanced and the patient may go crazy on the subject, just as a person becomes deranged over undue excitement at religious meetings and the like. Fortunately for society the nervous organization of but few individuals, in the aggregate, are susceptible to hypnotism, the influence of Christian Scienc, emind cure, spiritualism, mesmerism, charlatanism and like empiricism.—*K. C. Medical Record.*

ARTICLE III.

THE ODONTOBLASTS: THEIR FORMATION, FUNCTION AND POWER OF APPROPRIATION.

BY W. N. MURPHY, D.D.S., LA GRANGE, TEXAS.

It may be that the study of Hystology is tiresome and very unsatisfactory to a great many, and it has been said that in certain societies when a paper is to be read upon

his subject that many leave the room. Now if there be uch a man in this association I wish to disabuse your nind. When you neglect Hystology you neglect the vord of life to your profession, it is the keynote to your success, and until you base your treatment on it you can not hope for specific results, and the man who guesses at results is but to find himself sooner or later bound fast in the clutches of Pathology. But as the whole field of Hystology embraces too much for one paper it will be impossible for me to treat of the various stages of even the first or second dentition; indeed in our daily practice it becomes a matter of little consequence to us to know just what day or week of embryonal life the enamel organ begins its formation; we do not care to know what day the dental falical is served, it is of but little significance to us to know just when the foetal jaw begins to ossify, but when we come to consider that which maintains, nourishes, and supports the tooth throughout its natural life, it becomes a matter of profound interest as well as the most practical value to us in our treatment for dental caries to fully understand and appreciate this method of constructive metamorphosis, and in calling your attention to the odontoblasts, their formation, and function, I trust you will follow me closely so that if I run too far astray you may bring me back. It is true that we are indebted to but a limited number of the profession for the progress that we have already made in this special branch of dentistry, which has been handed down to us for the past decades, and it may appear to some that we have long since reached the zenith in this particular branch, but when we come to look around, and view our many failures, when we see the many changes that are being made by the revolution of time and the rapid strides that are being made in other scientific researches, especially other departments of dentistry, we are led to the conclusion that there is still room for further advancement in the study of dental as well as general Hystology, hence I make this apology for presenting what may be a direct antagon-

ism to what has been said heretofore. But now to t point; these cells, like all other cells, have a special fun tion to perform peculiar to the organ to which they belo or represent. Upon and near the surface of the den papilla may be seen these cells in all of the various stag of formation, from the fully developed cell back to thos just beginning their formation in the deeper layers of t connective tissue, new cells being formed all the time, an all the way on down from the earlier formation of the den tal papilla to the time the tooth has been erupted; yes, fur ther on until it has completed its natural function, or th entire pulp chamber has been completely filled with con secutive layers of physiological dentine, and I hope yo will note the full significance of the word physiological i this connection, for I fear there is not enough distinctio made between physiological and secondary dentine, but as it does not come under the province of this paper to trea on the formation of secondary dentine I shall pass on to my subject. In the first stages of the development o these cells we find deeper down in the connective tissue of the papilla small nuclei or protoplasmic masses sending out toward the surface of the papilla a ganglion or process which we may justly call the dental fibril, (of which we shall make mention later on) and which spread out into and through the membranaeboris anastomosing with the fibrils of the older cells. As the cells are completed they assume more of an oblong shape, sending back into the deeper tissue a ganglious or process just as they do in the first place, sending them to the surface. Upon these back ward processes or ganglii are started and formed new cells to take the place of the old ones, as they have completed their function and passed away or been made into layers of dentine. They are each one dependent upon the other in that each cell anastomoses with another by this ganglion heretofore mentioned, were this not the case the chain of dental fibrils would be broken as soon as the first layers of dentine were completed, and the new cells begin their in-

dividual labor, but by this gangliatic connection and this dependence of the new cells upon the old, and the old upon the new, we can see how the new cells begin their work just where the old ones leave off and thereby keep up the fibril connection between the last formed cells and the bond of union between the enamel and dentine. Without this connecting link in the fibrils the outer layers of dentine and enamel would cease to have any connection whatever with the newer layers of dentine, and they would separate from each other as the bark from a tree. The dentine of its self has no power of conductivity and without this fibril connection there could be no response to thermal changes, there would not be that accute sensitiveness that we find at the union of enamel and dentine where the fibrils anastomose so freely, but last but not least the enamel and outer layers of dentine would fail to receive the food necessary for their maintainance, and we would soon see that disintegration, or drying out of the waters of crystalization that we so often see in teeth with devitalized pulp, where there seems to be a tendency for the dentine and enamel to pull away from each other. Dry the sap out of a green tree and see how readily the bark will hull off of it.

Pardon me for referring to that renowned Hystologist and Microscopist Dr. Andrews, to whom I acknowledge my indebtedness although his opinions as given in his able and exhaustive article, and published in Cosmos of 1888, page 221, are in direct antagonism to the line of thought presented in this paper. According to his opinion one would be lead to believe that there were but one set of odontoblastic cells, and that certain fibered cells play a part in dentine formation, which we hold is erroneous. It is immaterial what name we give to designate the cells if they are all intended to do the same kind of work, which we claim they do, but as the term odontoblast has become so commonly used and I think properly, so I shall continue to designate them all as odontoblasts and endeavor to prove that they are all the same. According to his idea, as soon

as the adontoblasts (which must be about the size of a grain of wheat) have finished their work the power of Dentine must be at an end, but assuming this to be true, (which we do not), and giving the odontoblasts about 1/500 of an inch in length we can see that the amount of dentine produced would be inadequate to the demand. In fact, it would be a mockery of dentine; and granting on the other hand that the cells and membranaeboris have the power, (as claimed by Dr. Jewell, see Cosmos, August, 1886), of retreating as the walls of dentine which they are throwing up, begin to encroach upon them in order to keep up their work, and thereby produce an adequate supply of dentine, and at the same time keep up the fibril connection. What would be the natural sequence? We would soon have jungled up in the remains of the pulp chamber a bundle of cells to the exclusion of the very material with which they are to build dentine, but this cannot be true, it is contrary to the laws of constructive metamorphosis. But the cells being under the direct control and management of the nervous system, each one being supplied by one or more nerve fibers of that branch of the 5th pair of nerves which supply the Papilla by breaking up into many minute fibres and permeating the entire pulp and dentine, their power of appropriation being increased by what ever will stimulate these nerve terminations. The cells under the management of the nervous terminations have the power of taking up the material conveyed to them through circulation and producing calcosphorites beginning at the periphery and proceeding inward at the expense of the size of the pulp, each layer making the pulp smaller. But the question may be asked just here, do the cells diminish in size to correspond to the diminution of the size of the pulp. Yes, they diminish in size until they become a part of the fibril, loosing their identity as a cell. The tubular dentine coming on down to the end of the cell, and by reason of its semi-calcification has the power of squeezing in on the end of the cells so as to gradually reduce them in size to only an

enlarged portion of the fibril, (which probably give rise to the opinion that certain fibril cells play a part in dentine formation) and just here the newly formed cells begin their work forming dentine, and as the new cells are formed they diminish in number, one cell connecting with two or more old cells, by the backward prolongations of the several old cells running into the new one, or the new one rather being formed as it were just where the two run together. The new cells being as large and active in the later stages of dentine formation as in the earlier or first set of cells.

Now having gone briefly over the formation and function of these cells, we come to the consideration of another very important point, and one I fear has never received the thought that it really demands, viz: The power of these cells to appropriate the food necessary for building up the several types of teeth found in different individuals.

Are all teeth endowed with the same functional activity? Are they all possessed with the same density of structure? Do they all have the same number of odontoblastic cells? No!

Why such a variance in functional activity? Why such a descrepancy in the density of the teeth of two or more individuals?

Perhaps some of the phosphate feeders will tell us that it is due to an insufficient quantity of the different inorganics that go to build up the asseous structure, but the writer will tell you that it is due to a want of appropriation of these salts caused by a low power of nervous force and an insufficient number of odontoblasts to perform this their peculiar function.

We have all seen fair shells of enamel filled with the poorest quality of dentine.

In the soft, white chalky teeth, upon which we usually find the largest amount of salivary deposit and that of the softest variety, we usually find the smallest number of odontoblastic cells, while in the hard, dense variety upon

which we usually find the smallest quantity of deposit, as it is of the hardest variety, (except in persons past the meridian of life), we find the greatest number of odontoblast cells the increased number of cells being able to appropriate a large percentage of the salts necessarily making precipitation of inorganic in the saliva very slow and in very small quantities at any one time, just in the same rate that the cells vary in number will the teeth vary in density also the calculous vary in quantity and density.

But now to the point of appropriation. The blood being the means of transportation it is the vehicle that carries the food throughout the entire economy, necessary for constructive metamorphosis and we must therefore stop to consider whether or not it confines its work to such articles of food as are found in the animal and vegetable kingdom or whether it takes up and appropriates such combinations as may be roughly prepared by our hands. We know that it only has the power of taking up such articles as can be held in solution and conveyed to these remote parts. Yet we grant that she can and does take up and carry into every capillary that which is foreign to her natural demands and which do not promote constructive metamorphosis, but rather have the power of dragging out that which impedes nature in her work, we have a striking example of this in the results following a mighty dose of calomel or sulphate of magnesia but have we any proof that our earthy mixtures are ever appropriated and converted into that which protects the pulp from that which is now properly supposed to be one of the prime factors in dental caries viz: the "Bug."

Has any chemist ever demonstrated that a given quantity of carbonate of lime, carbonate of magnesia, etc., will give the same chemical compound or in the same form as that found in the animal and vegetable kingdom?

Then if all this be true we must give our attention to our food and see whether or not it contains a sufficient

quantity and whether or not the cells are able to appropriate it or not.

When the physician gives drugs for the purpose of conveying oxygen will he give it in the form of a paper of tacks or will he give it in such form as will be most likely to be readily assimilated? But when he gives ten grains Fe Sulphate to his patient daily does it not seem reasonable that he could get more than forty-five grains from the human body at any one time? I suppose he could if they had the power of appropriating all that doctors could stuff down them. Then in the face of all these facts can we crowd upon these few cells, this little band of operatives in this dentine manufacturing establishment phosphates in different forms and in such quantities as will build up large and strong teeth, or will we overwork them by sending them more material than they can spin up and work into cloth of dentine, which must be sent back to the salivary and other glands to be gotten rid of or thrown out of the way as waste? The different glands unquestionably have the power of extracting the excess of inorganics from the blood and throwing them out as waste as is evidenced by the analysis of normal submaxilary saliva as per Biddle and Schmidt, which is as follows:

Water	991.45
Organic Matter	2.29
Sodium Chloride, Calcium Chloride, Calcium Carbonate, Calcium Phosphate, Magnesium "	4.50
	1.16
	1.000

We also have a further example of this in the solids found in normal urine and the perspiration from our bodies as given by Martin and not necessary to recapitulate. But some might say that the solids which we find in normal saliva are intended to play a part in digestion but when we find that the saliva only acts on starchy food and this being done by the active principal ptylin it knocks the prop from

under any such claims, besides it would be unreasonable and not expect that nature has to resort to such a round-about and unnatural way of digesting the same thing in food so that after a careful consideration of all the premises we are forced up to the conclusions that it is not safe to expect to build up a better class of teeth for the individual, as nature has provided a way for refusing or throwing out all that she can not use.

Marti'n's analysis of one day's food for an adult is sodium chloride 482.9 and other salts in various proportion, so that we can see that in the course of one year we would take in the form of food more inorganics than the entire weight of all the bones and teeth of our bodies, and as it has never been claimed or proven that man is entirely reproduced in the short space of one year it is hardly reasonable to presume that this vast amount is all appropriated, else there would be no limit to the growth of man, and until some man can show me some more reasonable theory I shall hold that the low order of teeth is due to a low power of nervous force and an insufficient number of odontoblastic cells to appropriate a sufficient quantity of inorganics to build them up to the highest standard.—*Texas Dental Journal.*

ARTICLE IV.

THE CHEMISTRY OF DENTAL CARIES.

BY R. C. YOUNG, D. D. S.
(President of Alabama State Society.)

Caries is a pathogenic condition of the teeth, in no way similar to caries of bone, except in name. Its pathology has for long ages been a subject of investigation. Up to the present time there has been no universally accepted theory. The ancients attributed it to some humor of the blood, and verily they were not far wrong. How-

ever, we will consider some of the more modern theories. He must indeed be fastidious who cannot be satisfied with such a *repetoire*. We have the chemical, chemico-vital, electro-chemical, infusorial or bacterial, and hereditary theories, each under the able pens of its advocates seeming as plausible and acceptable as the others.

Let us get at its etiology by elimination. "That the fathers have eaten sour grapes and the children's teeth are on edge" is, I think more metaphorical than practical. That one or both parents could transmit this disease of the teeth seems improbable. We can but admit that they do, beyond a doubt, transmit to the offspring a predisposition or a favoring condition, by not giving to the child a vitality sufficient to combat the cause of the effect. Should it be a transmitted heritage then caries must be a disease the germs of which are lurking in the blood, and our venerable father Æsculapius and his early deciples solved the problem.

Will you consider with me my favorite theory—chemico-vital? Did it ever occur to you, that the animal body is one vast chemical laboratory, and that through the mouth passes the material for the countless chemical actions and re-actions which are continually going on? What is the character of this material? Food must embody two great principles, one to nourish, the other to supply heat to the body. In the process of digestion, these principles are separated into: 1st.—All that, whether animal or vegetable, which can be converted into albumen, and which is called albumenous, and constitutes nutritious matter: (we may add to these a few salts of the alkaline earths of which more anon). 2d.—All saccharine matters from vegetable or animal; these with the oleaginous principles are heat producers and are known as calorifacients.

Chemical analysis will demonstrate that every article from which these principles can be derived is convertible into acids which act directly upon the teeth. All soft or

plastic matter taking on formation must have some skeleton or frame. The bones give this support. It is otherwise with the teeth. They have their origin as a gelatinous mass whose form and contour are hardened and kept in shape by an infiltration of salts. I do not believe that here the animal and mineral are in what we understand to be a chemical union or solution, but rather a mechanical mixture. Let me illustrate my meaning by the simplest demonstration possible. Take water. Here we have a chemical union between oxygen and hydrogen, which can only be separated into its elements by a force equal to the force which was developed in their union. On the other hand the air which we breathe is simply a mixture, the oxygen and nitrogen being in no way chemically united. Thus they are separated with but little force.

We have said that all food passing through the mouth can be converted into acids. The inquiring mind will naturally ask how? Chiefly through fermentation. This name has been given to an interesting class of chemical changes which occur in all organic matter under favoring conditions, which conditions the mouth present *non cum exceptionibus*, and which are the primary steps of decomposition: different matter giving rise to different products, but all acid. The following are some of the principle forms. Alcohol fermentation producing CO_2, carbonic acid, and as regards the teeth probably the most harmless; the actous fermentation producing chiefly $C_2H_4O_2$, acetic acid. The lactic yielding lactic acid, $C_3H_6O_3$. Through its affinity for calcium this acid is present in all animal flesh. It is also a product of saccharine fermentation. We find it present in the repair of tissue and it may from its numerous sources be looked upon as the many-headed dragon. Remember the large amount of sugar entering into the *regime* of our daily diet, not only as sugar proper, but by the action of ptyline upon starch or farinaceous matter.

Other acids, we have, which are not of this fold, HCL, hydro-chloric, H_2SO_4, sulphuric, HNO_3, nitric, which last in my opinion is next to lactic in its deleterious effects upon the teeth. In fact which of these two acids is the prime factor in that most deplorable of all dental lesions, white decay, is an unsolved question to me. This class of decay must be associated either with patients suffering from chronic gingivitis, or with mouth breathers. In the former, pathology teaches that lactic acid is always present where granulation is going on. Take a patient with chronically inflamed gum margins and I guarantee you will find cavities of white decay, with hyperæsthesia, upon or about the cervix of the teeth. In those who breathe through the mouth almost the same condition will be found not however so strictly confined to the same territory. May not this be the effect of nitric acid, from the free supply of air oxidizing the nitrogenous matter present in the mouth? But you say you find this condition in no mouths which are kept scrupulously clean. So you may. HNO_3, nitric acid, is formed by oxidation of nitrogenous matter. In the presence of potassa we have a free supply of oxygen from the air. The saliva furnishes both the nitrogenous matter and potassa, the former the epithelium and soluble organic matter which by evaporation of the water of saliva are condensed. Admitting these acids to be present and knowing the teeth to be largely composed of lime salts the presence of caries seems readily accounted for.

All hydrogen salts when brought in contact with a suitable base form some soluble salt. Here we have them searching out the lime from the teeth, exposing the now unprotected animal matter which breaks down by first undergoing fermentation, forming more acid *per se*, then decomposition; in come the bacteria. Here is nutriment for them. Here they are in countless numbers feeding on this decomposed animal matter—removing each layer as it is formed by this affinity for acid for base. Step by step, atom by atom, continues the silent destruction of these

faithful sentinals which guard the portal of life, wreck health, happiness and beauty.

What is more indicative of health than a perfect set teeth? Where is happiness without health? Do they both dwell in the same temple? Need I ask what is more beautiful, what more expresive than those pearly gems peeping from rosy lips which part in words of love and sympathy or wreath themselves into smiles sweeter and more welcome than the chaplet to the conquering hero?

But let us return. We are confronted by a problem of apparent difficulty. We have found the product of fermentation to be acid. Not so with that of putrefaction. Here we are met by alkaloids which are not acid. Why then should they not neutralize the acid of fermentation and check the chemical action, *per se*, thus giving nature a chance to come to the rescue and repair the lesion as under favorable conditions she does in soft tissues? Will you agree with me when I say this does occur? Do we not see teeth which have decayed when with no interference of art the disease is arrested? May not this be brought about by re-action, the products of decomposition neutralizing those of fermentation giving nature an opportunity to exercise her functions? The vital forces needed in such cases is great. We can readily picture to ourselves patients in whose mouths this condition will be found. Are they not always disciples of Hygeia? Take a case in which this retrogressive metamorphosis has been checked. We find the bottom of the cavity to be vitrified dentine, corresponding to cicatricial tissue. Is this not a clear indication of what the great healer nature would have done? Let us accept from her our rule, and with the helping of science the day will not be far off when we can proudly unfurl our banner, on which suffering humanity may read "VICTRIX."
—*Dental Mirror.*

ARTICLE V.

SOME HISTORIC POINTS AND PRACTICAL HINTS ON CROWNING.

BY THOS. G. READ, L. D. S., ENG., D.M.D., HARVARD.

A paper read before the Students Society, National Dental Hospital, and published in the *British Journal of Dental Science*.

The clinical aspect of this subject as far as possible, I shall avoid, therefore the making of any special crown will not be described.

Crowning was probably attempted at a very early date.

In former days teeth required to be very loose to be removed, as the ancients had no suitable instruments with which to extract, and there was a strong feeling against mutilating the body. The hard work that the anterior teeth had to perform in tearing flesh from bones and other uses, to which they were put, moreover their exposed position renders them very liable to be broken.

No doubt some effort was made to correct this disfigurement, and it may be readily conceived that when an opening was noticed in the broken off part to correspond to one in the remains of the tooth left in the jaw, the broken or the corresponding part of another tooth was connected to the stump by means of a dowel or pin, often miscalled a pivot.

The earliest crowns were portions of natural teeth both of human beings and of the lower animals and artificial ones carved from various tooth-like substances.

I shall endeavor to conclusively prove to you that all crowns now used are modifications of methods known and practiced forty years ago.

In the year 1774, M. Duchateau, an apothecary of St. Germaine, and M. de Chemart, a dentist of paris, commenced experiments with the object of making teeth of porcelain, and after several years of perseverance they produced a material, the merits of which were fully recognized by the profession for dental uses.

Crowns were soon made in this material, they roughly resembled teeth and had a hold for a dowel, they were rather weak, being made of a poor kind of porcelain resembling wedgewood were glazed over with a semi-transparant glass of a greenish or blueish tint, the dowel used to set them with was usually of wood alone, or wood and wire.

But little improvement was made in their appearance until the year 1825, when Samuel W. Stockton, of Philadelphia, and a few others made a better composition and produced teeth much more life-like in shape and shade; in 1830 they made some crowns which were in many respects better adapted for use than any of a later date; the dowel hole was deeper, of better form and more conveniently placed.

In 1831, Dr. Lee of Alabama, used instruments very much like those described and used later by Dr. Brutter, these are of very little use as they are only suitable for circular roots.

In 1841, tube teeth with a metal dowel were used.

In 1849, a hollow dowel was patented for permitting gases and secretions to escape from the apex of the root.

In the same year, Dr. Lawrence, of Philadelphia, patented a crown similar to the Bonwill, it consisted of porcelain with a counter-sunk aperture for a screw.

Dr. Morrison, about this time, used a crown very like a Richmond. In describing this he mentioned a band or collar fitting around the root supporting a crown with a dowel. The logan is a modification of the old porcelain wood dowel crown, platinum being used instead of wood.

An ideal crown should reduce the chance of destruction of tooth substance to the minimum, be non-irritant to adjacent tissues, natural in appearance, strong enough to resist the strain of mastication and capable of being quickly constructed.

The only apparent manner in which a stump that is properly crowned can be lost is by disease in connection with the periosteum.

Crowning should not be attempted when the tooth is very loose, necrosed, exostosed, or surrounded with unhealthy gum.

It will be found impossible to adapt a collar or cap a crown in cases where the natural crown has been broken away for some time and the adjacent teeth have moved so as to form a triangular space, the base being towards the gum.

In England, it has been taught that in cases where the foramen at the apex of the root is widely patent such as in immature teeth, crowns could not be satisfactorily applied, but practical experience has proved this to be an error.

You are most of you aware that I teach that a chronic abscess, in connection with a broken-down tooth, discharging itself through a fistulous opening, that shows no tendency to yield to treatment by medication will often rapidly disperse, where the canal is filled and the stump crowned and bitten on.

The probable cause of the abscess is Nature's abhorrence of an useless member, therefore the broken-down tooth acts as a source of chronic irritation to the adjacent tissues, but when crowned and bitten on it again coming into use the surrounding part is stimulated and the inflammatory products are re-absorbed.

As an instance I might mention a case communicated to me by our esteemed late House-Surgeon, Mr. Fisk.

At the beginning of last winter, Mr. Fisk, at my suggestion, crowned a broken-down tooth having a

chronic abscess in connection with it, that had shown the least improvement, after several weeks of dressing. About two weeks after crowning, the abscess had disappeared. In the summer the patient returned with a very swollen face, reporting the crown to have come away a few days previous; it was replaced and swelling rapidly subsided. When a bicuspid or molar is broken down and has a living unexposed pulp, it will usually be best to apply an all gold cap, as then very little tooth tissue need be removed, but in such cases the pulp is very liable to die.

If the pulp be dead and there is sufficient tooth substance standing to hold the rubber-dam, apply it; should it be very much broken down, dress off the enamel and shape the roots as for a collar, then make a band of thin metal to fit, and use this to hold the rubber-dam. The rubber-dam having been applied, open the mouth of the pulp chamber and cut away all the dentine that forms the constriction at the neck, but do not drill out the canals; the perfect reaming out of the canals is in most cases an impossibility; owing to their irregular shape and direction. Also there is a chance of perforating the side or driving septic matter through the apex, and moreover the stump is weakened.

Any part of the constriction left, acts as a scraper removing particles of debris from the bristle as it is withdrawn.

In filling the root this septic matter will be pushed to the extreme apex.

Having cut away the constriction at the neck and thus formed the canal into a funnel, remove all debris of pulp and tooth, then syringe the canals out with an antiseptic wash. Very fine bristles, roughened with a file to hold a strain of cotton, should be worked up and down the canals to thoroughly clean them.

The canals having been well washed out, should be dried and filled with a material of low conducting power, which can be easily introduced and will form a solid filling at the apex.

Gutta-percha and oxychloride of zinc are useful in lling roots.

Dr. Whitten, of Boston states that oxychloride of zinc urns any remains of pulp to leather. He introduces it on a fine bristle, at first very thin, gradually using it thicker as the root is filled until at last he introduces the pure powder.

I have modified his method in finishing by introducing a gutta-percha cone, which acts as a piston on the soft oxychloride of zinc thus filling all small spaces.

Oxychloride of zinc is very useful in cases of irregular shaped roots where it is impossible to remove the pulp thoroughly, but for ordinary cases dissolved gutta-percha cones are best.

The cones should be made as wanted, and then they will be about the size of the canal, and the full piston action is obtained.

The canals having been filled, the upstanding remains of the tooth is cut away. The greater part of this is readily removed by using a drill Messrs. Ash & Sons have made me, it is simply a long fissure bur with a chisel point.

Two holes are made with the point from the labial to lingual surface, one at the mesial, the other at the distal part of the tooth. The tissue between the holes is now cut away with the fissue part of the drill, then one blade of a pair of excising forceps is placed in the labial, and the other in the lingual opening, the handles are pressed together, and the crown comes away.

The above is the method employed in California when felling large trees.

If a crown that solely depends for its support on the dowel is to be applied, cut the stump down to a point a little beneath the gum margin, then it will not be so likely to decay by decomposition of saliva and other substances.

When a gold cap is to be used the stump may be left,

standing well above the gum margin, but the sides must be made parallel.

Should a crown with a collar be applied, cut the stump away at the labio-cervical margin to a point a little beneath the gum edge. It may be left standing above the gum on the lingual surface slightly.

In order that the collar may fit the root closely all the way down, the side of the stump should be made parallel. This is best accomplished by paring off the enamel all around the stumps with chisels.

Dr. Whitten's broken back and Dr. Bennett's Nos. 5 and 6 are useful for this purpose. The enamel having been trimmed off, finish shaping the stump with a safety pointed shouldered fissure bur.

If the stump is shaped cone-like the collar will stretch and thus become loose every time it is removed in fitting, and it may be driven past the portion trimmed, when the projecting edge will be a source of constant irritation to the surrounding tissue. Moreover the ledge thus formed will permit of the accumulation of decomposing secretions. A dowel on no account need be of greater length than half an inch.

When using a metal-backed tooth in crowning an incisor or canine it is advisable in preparing the root for the dowel to cut as far as possible in the lingual aspect of the canal, as by this means the head of the dowel will be imbedded in the solder and thus be more strongly fixed to the cap.

When using a Logan dowel prepare the pulp canal with a conical drill similar in shape.

If the crown is to be a simple dowel crown, previous to taking an impression, shape a piece of wood like the dowel, and place this in the pulp-canal, removing it with the impression. For a gold cap or collar crown, an impression is best taken as follows:

Take a strip of telephone metal and fit it to the stump as if about to make a collar of that material. When it is roughly fitted place it upon the stump and take an impression by the patient biting into a piece of modelling composition or wax. When quite hard remove this from the mouth and cast in plaster, with the little band in position.

The following are the best metals for crowning:

Coin gold for gold cusps and bicuspid and molar bands. Green gold for incisor and canine collars.

Soft platinum for incisor and canine collar tops. Crowning metal one side gold and the other platinum for bicuspid and molar bands and backing certain teeth.

Fit coin gold bands roughly to the model obtained with the little telephone plate and then fit them in the mouth.

All fitting of green gold collars should be done in the mouth. In soldering a band or collar always have the join at the lingual part, and solder edge to edge. If the join is lapped there is always a point where it does not fit the stump.

The best clamp is a piece of binding wire. Do not mallet bands or collars on, if the stump is properly shaped and the band is the right size it will go on far better without the mallet.

In trimming a collar down at the labio-cervical margin always leave a little extra height for final driving home. The edge of a collar or band should as far as possible conform to the alveolar margin.

To make the surface of a collar flat, to which the top is to be fastened, use a flat file.

To prevent bands and collars bending in filing, fill them with composition.

In soldering on tops use as little solder as possible, place it on the outer edge and on a soldering gridiron, solder over a Bunsen flame.

The circumference of a tube tooth should be slightly larger than the cap it is to be fixed to, after fixing grind it to the same size.

The edge of a flat tooth should project just over the labio-cervical edge of the cap, but this overhanging part must be all cut away after soldering.

Back the porcelain with gold when the teeth are of a yellow shade, and with crowning metal with the platinum towards the porcelain when of a bluish tint.

Often for strength when backing a frontal or lateral tooth, it is as well to grind the porcelain away at the cutting edge to a gradual slant and carry the back up to the extreme edge. Occasionally on account of darkening the color this should not be done, but the backing cut away nearly to the pins.

In such cases a flat should not usually have been used but a tube tooth. When making a bicuspid or molar faced crown, the backing should be carried over the cutting and the cervical edges.

The pin surface of a saddle-back tooth should be ground flat with a safety edge stone, before being backed. In backing, the pins should be bent inwards as they are not in the way at the labio-cervical edge.

Specimens I exhibit will illustrate the preceding points better than a fuller description. The band to which the saddle-back tooth is soldered should be cut down to a gradual slope from the lingual surface to the labio-cervical margin with a flat file.

To obtain the cusps for a gold crown either place the band on the stump and fill it with composition or wax, which is then bitten into. The bands and contents are now removed and cusps are carved in this composition or wax, an impression of which is taken in moldine and cast in fusible metal and the die thus obtained is used to strike up the cusps; or my own method which I find much more expeditious is to strike up cusps in Messrs. S. S. White's

dies and knock down the places bitten on with blunt punches. This avoids the unsightly appearance produced when in grinding gold cusps to the bite, the solder is exposed and thus rendered liable to discoloration.

Fill all crowns by horizontally grooving the pulp chamber and notching the dowel if one is used; dry out the canal and fill it and the interior of the crown with oxy-phosphate of a creamy consistency. Drive the crown home with a notched tooth-brush handle, and one or two light blows with a lead mallet.

When the setting is quite hard, trim away all surplus of cement with a broken-back chisel.—*Ohio Journal.*

ARTICLE VI.

CURRENT DENTAL LITERATURE.

BY GEO. W. WILLIAMS, RICHMOND, IND.

Current dental literature, as an educating power, is no mean factor, especially to those in the profession. It is a question whether it is not the best means in use. Books are more elaborate, colleges more exacting, but for variety, range and freshness—in its influence to produce a gradual awakening through its continual presence—current dental literature exerts the greatest force. Books and colleges give more elaborate theories, invite us to more sumptuous feasts and impress us with greater dignity: they make us more professional, round us out with greater completeness, and give greater definiteness to our knowledge. Current dental literature, by its "line upon line, and precept upon precept, here a little and there a little," by the varied stand-points to which it attracts us, and by its practical appilca-

tion to the minutiæ of every day life, imperceptibly moulds us. It prepares us for our books and colleges, and follows us closely afterwards, ever doing us good.

There are now in existence in the literary field of medicine, dentistry and allied sciences something over 120,000 bound volumes, and about 240,000 pamphlets, making a total of more than one-third of a million of distinct and separate publications. When we go to count books by the million, it is very much the same as money by the million—not one in a thousand of us has any adequate conception of what the language means. To make a simple calculation, I will assume that we enter our professional career at the age of twenty-five. By a very liberal allowance, I will give you forty years, of 300 working days each, in which to become learned, famous and wealthy. In order that you might read the entire mass of existing professional literature, it would be necessary for you to read ten bound volumes each day and twenty pamphlets; one volume and two pamphlets each hour, providing you worked upon the "ten hour system." But this is only the beginning of sorrows, for the clatter and bang of the professional press is never silent for a moment, and it is pouring its stream through the flood-gates of the market at the rate of 1,500 volumes and 2,500 pamphlets a year. This annual product is the result of the labors of 11,600 writers; and here as usual, the American profession comes to the front with 2,800 writers, exceeding by 200 the most prolific nation of Europe—which is France with all her colonies. So you would need to add five volumes and eight pamphlets each day, and even more than this, as the current volume swells. Let us pause before this prodigious mountain, composed of some of the rarest gems, much lumber and more offal. We have caught this extensive literature, or it has caught us. I scarcely know which. Vast as it is, however, all that is really valuable has been gleaned, and sifted, and condensed until we have it within a moderately small compass. So that, with reasonable industry, moder-

ate means, and, what is of no less importance, good judgment in making selections, nothing that is intrinsically valuable, either as simply broadening the field of human knowledge, or as conductive to the highest interests of humanity need escape our attention. All progress is recorded through this medium, and the newest and freshest thought is always presented to the reading world—not only of our own profession, but with rare exceptions in everything. The vast swelling tide of thought and progress, of investigation and discovery, which is sweeping over the world in every department of science and art, is nowhere greater than in the dental profession; and it is our duty to keep abreast of this tide, that we may give our patients the benefit of the most recent and yet fully tried discoveries. In order to accomplish this, we must acquaint ourselves with the current literature of our profession, which will bring before us the thinkings, doings and revelations of the professional world. —*Dental Mirror.*

ARTICLE VII.

DANGERS FROM NECROSED TEETH.

Mr. A—— has been under my immediate observation for the past ten years and his case illustrates very forcibly at least one of the dangers of retaining necrosed teeth in their sockets. About nine years age the second bicuspid of the right upper jaw contained a cavity which was filled with amalgam and shortly afterward commenced to ache severely. He insisted on having the filling removed and the nerve killed, which was done. A few months later the tooth died and blackened and a sinus opened through the gingival mucous membrane in the region of the tooth's root. This state of affairs lasted about two years when a series of small abscesses occurred on the right pinna, which lasted for

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get another dentist's opinion, often enough not mentioning names until the opinion is expressed, and if this is unfavorable to the previously proposed operation the patient may elect to remain with No. 2 dentist and forsake No. 1.

Children will often enough lead their parents to change their dentist, because Mr. So and So is so "rough to poor little Willie." A bad smash at one house followed by a successful extraction elsewhere may lead to alienation of patient and dentist, even if the smash was absolutely unavoidable and the lucky extraction the fruit of fortuitous inflammation plus manual dexterity, leaving it an open question which factor played the larger part in the happy result. Under any and all of these circumstances how is the dentist who is appealed to in the second place to act, and what must his demeanor be towards his predecessor whose patients the people were before they came to him? Certainly, no item of professional ethics bristles with more difficulties or presents larger scope for the exercise of tact and judicial honesty. It is too often lost sight of that doctors and dentists alike have no vested interests in their patients, the practice of giving money for the goodwill of a practice gave rise to the idea, but undoubtedly, patients have an absolute right to change their dentist as often as they please, and at the present day they are more than ever disposed to act upon their rights and seek aid in their dental troubles where they consider they can most satisfactorily obtain it. Patient grabbing is quite another thing to accepting a patient who deliberately selects between A. and B. and prefers B., although, in this case, unless there is a definite cause of complaint against A., it is certainly B.'s duty to point out that the patient being recommended to A. is *ipso facto* his, and to send the person on to A. upon his return to the charge of his practice. Where patient-grabbing comes in is when a dentist asked casually to look in a mouth, volunteers a sneer or faint praise of work already placed in the mouth. In every case it is accepted by professional men as being quite outside the bounds of etiquette to criticise unfavorably the work of another duly qualified practitioner, and the offence is aggravated when the criticism is offered without solicitation. Probably, no better advice upon this most vexed question in pro-

fessional ethics can be given than that implied in the dictum, "do to others as you would that they should do to you." However, there are very many side issues which need ventilation and being well threshed out, which can very well be done through the columns of our "Correspondence," and we shall be glad if our readers will give their brethren the benefit of their experience upon the matter. Many complain that assistants as "grabbers," and not a few assistants, turn the tables by reporting "sharp practice" by former principals. Even allowing for the Briton's privilege to grumble, we think the question may well be looked at from all points of view.—*Editorial, London Dental Record.*

ARTICLE IX.

AN ANOMALOUS CASE ON SALIVARY CALCULUS.

BY EDMUND OWEN, F. R. C. S.

A lady recently came under my care for a troublesome but painless swelling of the left cheek. The medical man who sent her to me suggested that it was a case of distention of a greatly dilated parotid duct, possibly caused by a salivary calculus. Unfortunately this gentleman did not accompany her on her visit to me, and on the most careful examination I could detect no calculus, but found the cheek of that side somewhat prominent and unsightly. The lady said that she had been bothered by a swelling in that cheek ever since she was four years old, and that sometimes after a meal it was much more conspicuous than it was at another time. She was determined to have something done for the swelling, and I was content to hold my diagnosis as to the exact nature of the soft tumour in the suspense until I could make a thorough exploration, which I did a few days later, Dr. Prickett kindly helping. There was then a rounded doughy swelling of the one

cheek, but no calculus was discoverable. Anæsthesia having been produced, and the jaws being separated by Mason's gag, an incision was made through the mucous lining of the mouth and the buccinator, a lobulated piece of yellow fat at once protruding. Gentle traction being made on this, a lipoma of considerable size readily left its bed between the buccinator and masseter muscles. The cheek was then flat like the other. It seemed as if no further treatment would be required, and nothing more was attempted. Within a few days, however, it became evident that the patient did not share our favorable view of the case. She said that on several occasions the cheek had swollen as badly as ever. Never happening to see the cheek, however, when swollen as she described, I thought it not improbable that her imagination supplied her with such evidence as I failed to discover. She was therefore advised to return home and to apply again should she meet with further inconvenience. In a short while she duly presented herself, and directed attention to a small, hard substance, which shifted its position over the masseter; it was evidently the salivary calculus of which her medical attendant had spoken. An attempt was promptly made to extract it through the mouth by reopening the old wound, but on introducing a pair of forceps the concretion slipped away and so effectually concealed itself that further search for it on that occasion had reluctantly to be abandoned. On a subsequent occasion on which the calculus was discovered I leisurely examined it from the outside of the cheek, and found that the limit of its journey forwards was just beyond the hinder border of the masseter, and that with the slightest touch it slipped back into a dilatation of Stenson's duct, which formed a wide chamber behind the angle and ramus of the jaw. From this pouch the calculus could be swept out by firm pressure. Sometimes it was no easy matter to bring it out again, as it hid itself on the inner aspect of the mandibular angle in the capacious chamber. Having been twice disappointed in the treatment of the case when operating through the buccinator, I determined to cut straight down on to the calculus through the cheek, having chased it forwards and secured it by the finger pressed over the hinder part of the masseter. In this way its extraction

proved a simple matter. The skin wound, which was closed with horsehair sutures, healed by first intention, giving no trouble whatever as regards leakage of saliva, and leaving a scar which, from the patient's point of view as well as the surgeon's, is now hardly noticeable. The calculus was a phosphatic concretion of the size and shape of a small date stone.

Remarks.—No one who has carefully dissected the face can fail to have noticed the pad of yellow fat which is lodged between the masseter and buccinator, the little pellets of which obeyed the slightest touch of his forceps. But in the case under consideration the mass of fat far exceeded the normal amount, and when drawn out through the mouth constituted a lipoma of a very respectable size. Moreover, the swelling which had previously disfigured that cheek had so entirely disappeared that I feel justified in saying that the operation would prove entirely successful. Probably the irritation caused by the salivary calculus had brought about an over-nutrition of the fatty pad and so determined its hypertrophy, the other cheek remaining of normal size and appearance. Certainly the removal of the calculus alone would not have restored the symmetry, and had I extracted the concretion on the first occasion I might have hesitated to proceed to the ablation of the buccal lipoma, even if I had made a correct diagnosis of the nature of that swelling. Thus, as possibly not infrequently happens, failure on the part of the surgeon either in the way of diagnosis or treatment, worked for the good of the patient. As regards the removal of the calculus from the outside of the cheek, it is not an operation which one would generally recommend, lest a troublesome salivary fistula should result, but, seeing the perfect way in which the wound healed, the danger of such a contingency is probably over-rated.—*Lancet.*

Editorial, Etc.

CHOLERA PRECAUTIONS SUGGESTED.—The singular way in which the case of cholera reported from London was developed carries with it a warning which the quarantine officers in every port of this country would do well to heed and guard against. It seems that the patient on arriving at London from Calcutta put on some undergarments brought from India which he had not worn on the voyage. The germs of the cholera were in these garments, and though long dormant, soon displayed their activity when brought into the open air. This, at least, is the tenor of the New York Herald's advices, and the conclusion reached after thorough investigation of the case and interviewing the patient himself, who had circulated freely about London before he was taken to a hospital, and may have thus spread the germs of the disease. The physicians of the hospital entertained no doubt of the genuineness of the Asiatic type of the disease, but the government board later on concluded that although clinically undistinguishable from the symptoms of real cholera, the case may be local cholera, such as occurs in London every year. Nevertheless dispatches from the East continue to report the progress of real cholera, and it would be well for the health authorities to exercise even more of their habitual vigilance to prevent the introduction or spread in our ports by shipping.

WASHINGTON'S TOOTH.—Isaac J. Greenwood, of New York, is exhibiting a tooth in a glass case. The tooth is mounted in gold. Above it hangs this extract from Mr. Greenwood's father's will: "I give and bequeath to my eldest son, Isaac John Greenwood, forever, all the curios, medallions,

snuff-boxes, Gen. Washington's tooth and the under false jaw of teeth made for him by my late father, John Greenwood." The tooth, a large-sized molar, yellow from use and age, was the last one removed from the illustrious Washington's under jaw, according to the diary of Mr. Greenwood's father. In another glass case Mr. Greenwood exhibits a letter from Gen. Washington recording the remittance of $16 for a "false jaw." The letter was dated from Mount Vernon, January 6, 1799.

GETTING AHEAD OF ST. PAUL.—Dr. J. N. Crouse, of Chicago, is a multifarious-officed gentleman. He is president of the Dental Protective Association, chairman of the executive committee, chairman of the committee on arrangements, and hustler in general for all sorts of miscellaneous business. He is an exceedingly shrewd and smooth tempered man, one of that sort that is never ruffled, but always so dead in earnest that most folks think it but right to give him his own way without dispute, those who don't generally get the worst of it, and that is precisely what happened to the Chicago, Milwaukee & St. Paul railway on the day when the members of the convention arrived. Dr. Crouse, in his capacity as chairman of the executive committee, had to make the railroad arrangements. When he arrived at the Milwaukee depot in Kansas City, it happened that, through some misunderstanding or failure of other roads to make connections, there were only thirty or forty dentists to board the special train that had been ordered, while the railroad officials had expected at least a hundred. It was useless to represent that there were more than a hundred extra men on the way who would take the regular trains to Excelsior Springs. The officials refused point blank, and with what Dr. Crouse thought "most damnable iteration," to take the trains out unless $50 was paid in addition to the fares already represented by tickets. Finally Dr. Crouse consented, the money was paid over, a receipt taken and the special dentists' train started. Just after cross-

ing the river Dr. Crouse noticed the conductor collecting fares from people who had boarded the train at way stations. This was his opportunity. A sharp pull at the bell brought the train to a halt; it also brought the conductor to remonstrate. To that official's surprise he was taken in charge by the hustling doctor, who informed him that for the time being he must consider himself in the employ of the American Dental Association, producing the receipt for $50 in support of his statement. The doctor then compelled the conductor to return all fares collected and to remove the passengers that had paid them from the train. These unfortunate wights were dumped into a corn field and the doctors' train moved triumphantly on to Excelsior Springs.

TRADE IN CAST-OFF TEETH.—A medical statistician estimates that the citizens of the United States are carrying gold to the value of £100,000 in the recesses of what ought to be their teeth. There are no people on the face of the globe who have such bad teeth and who spend so much money upon them as Americans, says a writer in the Popular Provider. No doubt the habit of hurried feeding and the wholesale consumption of sweet dishes have assisted much toward this end. But it is not a mistake to suppose, as says the medical statistician, that false teeth set in gold are buried when their owner shuffles off this mortal coil. If this is the custom in America it is not so in England, or why the numerous advertisements offering to buy old artificial teeth? The old teeth are not bought to use again, as some nervous people fancy, but simply for the sake of the gold.

Monthly Summary.

DANGERS OF HYPNOTISM.—The dangers of hypnotism are, according to the *Lancet*, not a few. At Nurembury a case of some public interest has recently been tried in the police court. A commercial traveller, while in a restaurant, told the waitress to look steadily at the white of his eye and hypnotized her. On the second occasion he repeated the experiment, but this time the sleep was so profound that a medical man had to be called, who had the utmost difficulty in rousing the girl. The commercial traveller was accordingly summoned to appear before the magistrates, and the severe sentence of eight days' imprisonment was passed on him, which will probably be efficient in checking similar performance in that region. In France the practice of hypnotizing people for amusement seems very common, and unpleasant consequences are reported. At a supper party in Paris recently one of the company hypnotized a girl and was unable to rouse her. She was consequently taken to the house of a medical man, and after a time she recovered consciousness. The whole party was taken in custody by the police, and were not released until next day. Even when hypnotism has been practiced by competent medical men for remedial purposes, unpleasant accidents and ulterior consequences have again and again occurred, so much so, that recently an order has been issued by the French Government prohibiting surgeons in the army and navy from practicing it. It ought to be distinctly understood, both by the profession and the public, that hypnotism is not devoid of danger at the time, and not infrequently has permanently impaired the moral and emotional control of patients. A medical man is bound, before recommending hypnotism for a patient, to weigh the question as carefully as he would that of the advisability of administering an anæsthetic.—*London Dental Record.*

DANGER IN EXERCISE.—The *Providence Journal* quotes Dr. Patton, Chief Surgeon of the National Soldiers' Home at Dayton, Ohio, as saying in an interview in Pittsburgh, the other day, that of the 5,000 soldiers in the Dayton home "fully 80 per cent. are suffering from heart disease in one form or another, due to the forced physical exertion of the campaign." And he made the prediction that as large a percentage of the athletes of to day will be found 25 years from now to be victims of heart disease, resulting from the muscular strains that they force themselves to undergo. As for the likelihood of exercise to prolong life, it may be said that according to the statistics of M. de Solaiville there are more people living in France to-day who have passed the age of 60 than there are in England, the home of athletic sports. And there is probably no nation in Europe more adverse to muscular cultivation for its own sake than the French. Great athletes die young, and a mortality list of Oxford rowing men published a few years ago showed that a comparatively small percentage of them lived out the allotted lifetime. Dr. Jastrow has demonstrated in some very elaborate statistics that men of thought live on an average three and a half years longer than men in the ordinary vocations of life.

PYORRHEA ALVEOLARIS COMPLICATED WITH NECROSIS.—*By Dr. John Coyle.*—My paper is a brief one—confined in fact to the relation of a case from practice which I think will prove interesting, if not instructive. In February a patient presented, and an examination showed that the cause of his suffering was the right inferior incisor. It was a distinct case of pyorrhea alveolaris, pus exuding from the pocket. This was the only tooth in his mouth which was affected. No calculus was present either on the affected tooth or any others. It was evidently a case beyond hope, and extraction was resorted to. It is gener-

ally claimed that after extraction the usual course is a restoration of the parts to health. Indeed, this is one of the arguments used by those who claim that this is solely a local disturbance.

In March the patient returned. Examination showed that necrosis had supervened, involving the alveolar ridge from the molar on the left side to the canine on the right. All the teeth were excessively loose, though they had been perfectly firm when last seen. The treatment was as follows: The teeth were ligated together, thus making them somewhat firm, and the diseased parts washed daily with a mixture of acetate of zinc—one drachm to the ouuce of water. As a tonic, the following was prescribed:

R

Potass. Iodidi, - - - -	oz j
Tinct. Gentian Comp., - - -	" iv
Sprts. Frumenti, - - - -	" xii

M. Sig.—Tablespoonful three times daily.

In October all the loosened teeth were firm in place and the disease was controlled. A point of interest is that the necrosis was confined to the cancelous portion of the bone only.—*Dental Mirror.*

HYPODERMIC INJECTIONS OF ERGOT IN FACIAL NEURALGIA.—Dr. Stewart, in *Peoria Medical Monthly*, says: For the relief of facial neuralgia hypodermic injections of ergot are far superior to either aconite or gelsemium. Any one who has used it will never resort to either of the above named remedies. I have used it in the last six years and have never had it fail in but one case. In that case there was evidently organic disease. Ordinarily one injection relieves the pain permanently; sometimes two; and in one very severe and obstinate case, which had gone through the hands of several physicians without relief, it required three. After the third injection he never had a twinge of pain. I put it in the temple as nearly over the seat of pain as convenient. I used the plain extract, and have it made on purpose for hypodermic use. One minim represents two grains

of ergot. Of this I use from eight to twelve minims of blood warm at one injection, and without diluting. In order to make this a success two things are essential; one is, to have a fresh and pure article of ergot to make the extract from; the other is, to have the extract reasonably fresh. If kept too long it is not only worthless but irritating. When properly prepared and fresh it produces more or less pain for ten or fifteen minutes, and when the pain from the injection subsides the neuralgia is usually gone and does not return. I have used this treatment for sciatica and other forms of neuralgia, but not with very satisfactory results.—*Buffalo Medical and Surgical Journal.*

A PRACTICAL METHOD OF ELECTRO-GILDING GOLD DENTURES, BRIDGE-WORK, AND COLLAR CROWNS.—Dr. H. Fielden Briggs in *London Dental Record* describes his method as follows: First prepare in the following manner a stock solution of gilding fluid. (1) Take of pure gold 30 grains and digest in aqua regia (H N O3 + 3 H Cl.); (2) evaporate *almost* but not quite to dryness; (3) dissolve this in twenty ounces of water; (4) then add half ounce of cyanide of potassium. This fluid will last a long while, and should be kept in a bottle ready for future use at any time.

To Gild: Heat gilding solution in jar in saucepan of water to about 150° Fah. While this is heating, polish the denture with whiting, wash well with plenty of soap, and place it into a basin of clean water; then avoid handling or exposing it to the air.

Attach to the positive electrode a thin sheet of fine gold, which should be not less in area than the piece to be gilded.

To the negative electrode attach the denture. When the gilding solution is heated, place the positive and negative electrodes with their attachments into it.

In a few minutes a dull brownish yellow deposit will be found on the denture. Polishing on the lathe with whiting will produce a rich deep gold appearance, giving the plate uniformity of color, obscuring the distinctness between it and the solder, and giving a perfectly finished aspect which lasts for many years.

By using a battery of six (1 quart) Leclanche cells and keeping the sheet of gold always attached to the positive electrode, a piece can be gilded at any time in a very few minutes.—*Dental Record.*

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DENTAL SCIENCE.

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ARTICLE I.

ON THE DANGERS ARISING FROM SYPHILIS IN THE PRACTICE OF DENTISTRY.

BY L. DUNCAN BULKLEY, A. M., M. D.

(*Continued from page 250.*)

Roddick, ‡ of Montreal, has recorded a case of more than usual interest, where the primary syphilitic sore on the gum was undoubtedly the result of inoculation by means of dental forceps used in extracting a tooth; it is worth mentioning somewhat in detail. The patient was the wife of a physician, aged about thirty, and the mother of healthy children. She had always been in excellent health until about a year previous to her visit, when she had a tooth extracted, the operation being difficult and accompanied by considerable laceration of the gum. The wound showed no tendency to heal, but became sloughy and indurated. Within a few weeks the glands beneath

‡ Roddick, "Montreal Med. Journal," August, 1888, p. 98.

the jaw were found to be enlarged, and shortly an erythematous rash covered the body and extremities, followed later by a papular and squamous eruption, and sore throat and alopecia were soon added, to complete the picture of constitutional syphilis. Careful investigation failed to reveal any other source of contagion than the dental operation; the husband was entirely free from disease, and Dr. Roddick, who is an exceptionally careful man, and thoroughly qualified to judge, concluded that "in all probability the instrument used by the dentist was made the vehicle of contagion by being brought in contact with a mucous patch in the mouth of a syphilitic person previously operated upon."

2. Dangers to the *dental operator* from exposure to the syphilitic poison.

In the second division of this portion of our subject, namely, the dangers from syphilis to the operator in dental procedures, the number of instances on record is fewer, but they are very striking and well authenticated.

The first instance discovered was that of a dentist who reported his own case. * . The inoculation took place on the middle finger of the left hand, above the nail, which was followed by constitutional syphilis. He could not trace the infection to any particular patient, but there could be no doubt that the poison came from mucous patches in some one's mouth, which lodged in one of the little cracks which so commonly come about the root of the nail.

Bumstead, † when speaking of the digital inoculation of accoucheurs, says that he has "known dentists to suffer in the same manner."

Neumann ‡ knew of a dentist who tore his hand on a sharp tooth while operating on a syphilitic patient, which injury was followed by severe syphilis.

* "Boston Med. and Surg. Journ.," vol. lviii. p. 88.

† Bumstead, "Venereal Diseases," edition of 1879, p. 432.

‡ Neumann, "Allg. Wien. Med. Zeitung," 1884, p. 61.

Jonathan Hutchinson, § in his excellent little clinical work on Syphilis, gives a plate of a well-marked circular, indurated chancre on the pulp of the finger of a dentist, which had been produced by a scratch on a patient's tooth.

Dr. Otis has recently, in a personal communication to me, related the following case, which is of peculiar interest, as it illustrates a method of infection in dentists which has not been previously noted. Mr. C., a dentist in large practice, applied for treatment with a chancre on the lips, accompanied with a general syphilitic eruption; his wife also contracted a chancre on the lip from him, with subsequent general syphilis. The infection was traced to a patient whom he had operated on, who had in the mouth a suspicious sore, claimed to be a "canker sore," but found afterwards to be syphilitic. The dentist was in the habit of occasionally holding instruments between the lips while operating, and the poison was conveyed thus to his lips by an instrument infected from the patient.

Although the number of these recorded instances of syphilis communicated in dentistry, which I have been able to find, after a very careful study of the subject during several years past, is relatively small, it is yet quite sufficient to establish the fact that such infection does occasionally take place, and to place us on our guard against such accidents in future. Undoubtedly but few of the cases occurring have ever found their way into print, and it is possible that when special attention has been called to the subject many more of them will be recognized and reported.

Having now considered the clinical basis on which rest the grounds for believing that there are dangers arising from syphilis in the practice of dentistry, we will examine the modes in which this accident can arise, and then consider the means for preventing the occurrence of this sad event.

§ Hutchinson, "Syphilis," London, 1887, plate ii., Fig. 2, p. 96.

Two methods of the non-venereal transmission of syphilitic virus are recognized, namely: First, the *direct*, and, second, the *indirect*.

1. *Direct syphilitic inoculation.*—In the first instance the poison is transferred directly from one individual to another, either through already existing wounds or in those occasioned at the time. The number of recorded cases of the communication of syphilis by kissing is now very great; hundreds can be found in literature, and I myself have seen over thirty cases of chancre of the lips. Infants at the breast of syphilitic nurses frequently acquire the disease, and breast-drawing by adults has given rise to numberless cases. In several series of instances syphilis has been both acquired and given by the application of the tongue to the eye to remove foreign particles and to heal disease; the poison has also been acquired and given in the process of wound-sucking, and other more rare modes of transmission which have been reported could be enumerated did time permit.

The particular method which is, perhaps, of most interest to us in the present connection is that of tooth wounds. The number of cases of this class which are on record is very great. Nearly all of them are from bites, usually intentional, and details of these need not be presented here. There are also a number where the infection has taken place from a blow on the mouth, the knuckles being wounded by the teeth. The first of these tooth-wound cases was observed near the beginning of the century by Boyer, * but not reported until 1840 by his son. Since that time a number of observers have recorded cases, some of whom have each seen several. Thus, Gamberini †. saw three cases, C. Pellizzari ‡ three cases,

* Boyer, "Gaz. Med. de Paris;" Behrend's "Syphilidology," 1831, iii p. 322.

† Gamberini, "Gior. ital. d. mal. ven.," 1878, p. 365.

‡ Pellizzari, "Gior. ital. d. mal. ven.," 1882.

Van Harlingen § five cases, Lavergne and Perrin* five cases, Lesage † three cases, Finger ‡ four cases, and Jonothan Hutchinson § three or four cases.

In this connection may also be mentioned the fact that surgeons have repeatedly been inoculated in wounds occurring accidentally during operations on syphilitics, as also in other wounds when examining those with the disease.

When we consider the relatively large number of physicians and surgeons who have become thus accidentally inoculated in the discharge of professional duties (and I myself have seen at least seven or eight cases), the only wonder is that the accident does not occur oftener to dentists, whose fingers are continually bathed in the buccal secretions, often from mouths with active and intensely contagious syphilitic lesions.

Syphilis is rarely communicated to the patient in dental operations by the direct or immediate method of contact, although the cases of the communication of syphilis by tooth transplantation, already referred to, were probably by the direct method, the poison being undoubtedly carried directly in the transplanted tooth from a syphilitic to a healthy person, as the tooth was then inserted quickly after its removal.

It would also be possible for a dentist with an unrecognized chancre on the finger, in an early stage, to communicate the poison directly to a patient's mouth, as in the case of midwives, already mentioned; but no such instance has been found in literature.

2. *Indirect syphilitic inoculation.*—The second, indirect or mediate, method of contagion is that which

§ Van Harlingen, "Phil. Med. Times," 1884-85, xv. p. 80.

* Lavergne et Perrin, "Ann. de Derm. et de Syph.," 1884, 2d series, v. p. 382.

† Lesage, "Chancre par mosure," "These de Paris," 1885.

‡ Finger, "Die ven. Krankheiten," 1886, p. 14.

§ Jonathan Hutchinson, "Syphilis," London, 1887.

usually takes place in cases where the disease is transmitted during the operations of dentistry, and, indeed, in a very large proportion of the cases of syphilis innocently acquired.

Time and space would fail to tell of even a small share of the methods of mediate contagion of syphilis which are scattered throughout literature, but a brief statement of some of the principal modes by which it has been observed to be conveyed innocently from one person to another may aid us in understanding how the accident can occur in connection with dental operations.

As is well known, various household utensils, such as cups and drinking-vessels, spoons, tobacco-pipes, etc., have been the means of spreading the disease to hundreds of cases. The glass-blower's pipe has also caused a number of small epidemics, and cases have been traced to the assayer's blow-pipe, whistles, musical instruments, toys, pencils, pins, tack-nails, thread, paper-money, coin held in the mouth, etc. Of instruments used about the mouth, laryngo-scopes and tongue-depressors are peculiarly liable to transmit the disease, but the only instance found is a case reported by Jumon, * where a paper-cutter used to depress the tongue gave rise to syphilis. The cases traced to the use of the Eustachain catheter have been already mentioned.

Syphilis has also been conveyed by means of various fabrics, and a number of striking instances are on record where towels and napkins have transmitted the disease. An interesting case is given by Leloir, † where syphilis was communicated by means of a handkerchief.

Of peculiar interest are the cases on record, of which there are a number, where the disease has been transmitted by means of a tooth-brush. This was first observed by Blumenbach ‡ in the last century, and later by Baxter, §

* Jumon, "These de Paris," "Syph. ignoræ, 1830.
† Leloir, "Lecons sur la Syph.," Paris, 1886, p. 60.
‡ Blumenbach, "Bibliothek fur Aerzten," iii. p. 197.
§ Baxter, "Lancet," May 31, 1879.

and also by Bumstead and Taylor, * and more recently Haslund † has reported a similar case. Knight § has also recorded a case, seen by Bumstead, where a lady received a chancre of the tonsil apparently by means of tooth-powder, her syphilitic nephew dipping his brush into her box when cleaning his teeth.

It is understood, of course, in all these instances that the various objects served as a medium to convey the dried syphilitic secretion which adhered to them directly to the tissues of the individual who became infected, and it is readily seen how, unless precautions are exercised, the various implements and articles used in connection with dentistry may very easily become likewise the bearers of syphilitic virus.

It is not possible always to determine exactly upon which instrument, or in what manner, the poison is conveyed, but the preceding instances which have been cited show, on good authority, that the infection did take place in some way in connection with and in consequence of dental operations.

The agents and objects which may become the conveyors of the poison are as numerous as the implements and articles which may come in contact with the mouth in dental manipulations. For convenience these may perhaps be grouped in three or four classes, as follows: 1 instruments proper; 2, napkins; 3, rubber dams, wedges, dental floss, etc.; and, 4, plaster, rubber, etc., used in connection with the making of artificial teeth and sets.

Among instruments the only one plainly shown to have communicated the disease is the forceps, in the case related by Dr. Roddick, in which the site of the extracted tooth, where the gum was torn by the forceps, became a syphilitic ulcer, the seat of the chancre or primary sore of

* Bumstead and Taylor, "Path. and Treat of Ven. Dis.," Phila., 1879, p. 432.

† Haslund, "Monatshefte fur prakt. Dermat." 1885, p. 456.

§ Knight. "New York Med. Journ.," 1884, p. 662.

syphilis. But it is readily seen that the instruments used in excavating and plugging may also become infected, while there is peculiar danger in such instruments as files, burrs, and drills, where there are many depressions difficult of cleansing which may receive and retain the virus. Napkins and towels may convey the poison, as has been shown, while rubber dams, if used a second time, would very readily give infection from their prolonged contact with the soft parts. The same is true of wedges, a portion of which is often used for different patients, as also thread, ribbon, or dental floss passed between the teeth. The different workmen in a furrier's shop were once infected * from a thread passed between them and bitten off. My scanty knowledge of the process of taking casts and preparing and fitting artificial teeth does not permit me to speak in regard to any dangers arising from this, but I should judge that possibly accidental infection might occur in this line of work, perhaps quite as unexpectedly as it has happened in connection with other branches of dental practice.

We come, finally, to the most practical and important part of our subject,—namely, the prophylaxis, or prevention of the occurrence of this most unfortunate accident, the transmission of syphilis in the practice of dentistry. It may be somewhat out of place in the presence of this Society, including, as it does, many of the best elements of the dental profession in this city, to urge the simple matters of precaution about to be mentioned; but, as some may not heretofore have recognized the immense importance of the matter, it is best to err on the safe side, and to present briefly and clearly the precautions which seem to be indicated from what we know of the nature and virulence of the poison of syphilis.

As before mentioned, the virus or contagious element comes in liquid form from a chancre or a moist, exuding

* "Arch. f. Derm. u. Syph.," viii. 660.

surface, or, more rarely, with the blood itself, from a fresh wound. The secretion is very sticky and adherent, and when dried on an article forms a delicate coat, which could hardly be perceived. Nothing is known in regard to the viability of the virus, or the length of time during which it may retain its actively contagious character, but from many instances in the various conditions of life and in medical experience, it would seem that, under proper circumstances, it retains its vitality and activity for some considerable period longer than that possessed by the somewhat similar virus of vaccine. Days, weeks, or perhaps months after an instrument or article has become infected, it may again give off the poison and produce inoculation. Simple washing will not destroy the poison, although it may so dilute it that it becomes innocuous.

There are, however, several elements which are destructive to the life of the syphilitic poison, and these are heat and cold and the so-called disinfectants, antiseptics, or germicides. Cold can hardly be utilized practically, as a sufficiently low temperature for a requisite length of time would be difficult to maintain. Heat, however, may readily be employed in a thoroughly efficient manner, and is undoubtedly the very best means for destroying contagious principles. Inasmuch as dry heat, as in a flame, would injure instruments, as to their temper, the desired results are best obtained by means of moist heat, obtained in boiling water. Instruments and other articles placed in a vessel, and then subjected to vigorous boiling for half an hour or so, may be considered absolutely freed from any power of conveying contagious matter.

Various chemical substances are also capable of destroying the virus when efficiently used; prominent among these stand bichloride of mercury and carbolic acid. The mercurial salt has its disadvantages, both from its poisonous nature when in strong solution, and also from its corroding action on some metals. Carbolic acid, therefore, remains as the best of the two; and, indeed, when pro-

perly used, answers all the requirements of the case. But one must not be deceived by the odor, and be led to use a too weak solution, for it is questionable how serviceable the high dilutions used in anti-septic surgery are in overcoming such a poison as syphilis. The strong acid certainly destroys it, and a safe method is to dip the instruments in a ninety-five per-cent. solution, wiping or scrubbing them afterwards. A much weaker strength, possibly even a ten per-cent. solution, would probably be effective if they were left a considerable time in it and then thoroughly washed. I will not take your time in discussing other disinfectants, but only wish to impress the fact that not only for ordinary cleanliness, but also and particularly to avoid the possible danger of infection, too great care can hardly be spent in rendering instruments and everything pertaining to dental practice as absolutely clean as thought and labor can possibly make them.

Files and burrs are particularly liable to catch and hold the poison of syphilis in their fine serrations, and as they are also peculiarly liable to wound the soft parts they may really become means of contagion. Also the various articles connected with polishing the teeth are dangerous if not properly cared for. I well remember more than one dentist, in times past, polishing my own teeth with a bit of wood dipped in pumice-stone, which wood had evidently been used for former patients. Rubber dams and wedges can, of course, be readily disinfected in strong carbolic solutions, and napkins are rendered aseptic by boiling.

In regard to the personal prophylaxis of the dentist against acquiring syphilis in dentistry little need be said. The careful guarding of fresh wounds and thorough cleansing of the hands, and immediate sucking of any wound made during operations, will generally suffice to prevent the untoward event. "Forewarned, forearmed" applies well in regard to all the dangers from syphilis in dentistry. If the danger is thoroughly well known and appreciated, half the battle is won.

The question here arises, how far the dentist should be acquainted with syphilis, so as to be able to recognize it and avoid its dangers. Undoubtedly it would be most desirable that this knowledge should be obtained, but, unfortunately, a practical acquaintance with syphilis is somewhat difficult to obtain, except after considerable clinical experience in this branch of medicine. But it would certainly be extremely desirable that the mouth lesions should be known to dentists so as to be recognized, and this would be a fitting subject for the consideration of instructors in dental colleges.

A word may be added in regard to the duty of the physician in charge of syphilitic cases, when the patient may desire dental work to be performed. Should he prevent the patient from having the work done, and from thus exposing others, or should he acquaint the dentist with the diagnosis of the case and warn him against contaminating himself and others? The latter question involves an ethical point as to how far the medical adviser is right in revealing the nature of a patient's disease to others, and is a difficult one to answer; for professional relations require secrecy, especially in such a complaint. But, on the other hand, it cannot be right to wittingly expose others to the poison of syphilis. My practice has been to warn the patient earnestly of the danger, and, as far as in my power, to prevent his having dental work done while in the infective period, and especially while there were mouth lesions present, frequently examining the mouth for this purpose. If he failed to heed my instructions I should feel justified in warning his dentist.

In concluding our consideration of the topic of the evening, I beg to add that I have by no means wished to excite unnecessary alarm, but only to present facts already well known and conclusions which must be accepted by all those acquainted with the subject. With the presence of such a disease among us which often appears even in the best classes of society, it is well to recognize and under-

stand the dangers which may arise therefrom, and to do our utmost to avert them. This, I trust, will be the result of the presentation of the subject which has been considered.—*International Dental Journal.*

ARTICLE II.

DR. KOCH'S CONSUMPTIVE CURE.

The article by Professor Koch in the Deusche Medinizische Wochenschrift, (German Medical Weekly,) published at Berlin, is entitled "Further communications on the cure of tuberculosis and experiments which Dr. Libbertz and Staff Surgeon Pruhl performed relating thereto under Professor Koch's direction."

In this article Professor Koch says that he is as yet unprepared to indicate the source from which the curative matter is derived. Neither is he ready to explain the method of preparation. The reason he gives is that the experimental work has not yet been brought to completion. He states, however, that the curative lymph itself can now be obtained from Dr. Libbertz, whose address is No. 28 Luenburger strasse, Berlin.

The lymph is described as consisting of a brownish transparent liquid. It is so prepared as to be proof against deterioration. When, however, it is diluted with water to the necessary degree for use the matter is liable to decay. It is necessary, therefore, that the attenuations should be perfectly sterilized by heat and preserved in wadding covering, or prepared with a solution of phenol fifty per-centage strong.

When taken into the stomach the curative matter proves to have no effect. It must be applied sub-cutaneously by means of a valveless syringe. The kind of syringe recommended by Professor Koch is one furnished

with a small, hollow rubber ball. This syringe approved itself to him during his bacteriological experiments. Its merit is that it can be easily and surely rinsed with absolute alcohol and kept in a perfectly aseptic condition. In thousands of cases, he says, where it has been used for subcutaneous injections not a single abscess resulted.

When the curative matter is applied to a patient the usual course is to inject it under the skin of the back, between the shoulder blades and in proximity to the loins. The experiments show that human beings are much more susceptible to the effect of the new substance than are guinea pigs, which have been largely used in the course of the investigations. Two cubic centimetres of the fluid applied to a guinea pig produced little, if any, apparent effect. Twenty-five hundredths of a cubic centimetre, however, intensely affected a healthy, full-grown man who was subjected to experiment.

Prof. Koch experimented with the fluid upon his own body and describes the effect. He injected twenty-five hundredths of a cubic centimetre of the fluid under the skin of his upper arm. Three or four hours after the injection was made he experienced a contraction of the limbs and a marked feeling of lassitude. At the same time he felt a desire to cough, together with difficulty of breathing. These symptoms increased rapidly and in the fifth hour he experienced an unusually violent rigor. The shivering lasted for nearly an hour and was accompanied with nausea and vomiting. The temperature of his body rose to 39.6 centigrade. After a period of twelve hours the symptoms began to abate, the temperature of the body declined and on the following day resumed its normal degree. The heaviness of the limbs and the feeling of lassitude, however, continued for some days, during which time the point on his arm at which the injection was made continued to be painful and remained red.

The experiments so far conducted show that the lowest limit of effective strength of the fluid in a healthy human

body is one hundredth of a cubic centimetre. When this amount is applied to a healthy human subject it produces little or no reaction. The same result follows when fluid of this strength is applied to diseased persons who are suffering from other than tuberculous affections, but in persons affected with tuberculosis the same quantity produces a strong general and local reaction. The general reaction consists of an attack of fever, which usually begins with shivering; the temperature of the body rises to over 39 and in some instances even to 41 centigrade. At the same time pains in the limbs are noticeable. The patient coughs, experiences much irritation and great exhaustion. Some patients also suffer from nausea and vomiting. In some cases there is noticed a slight icteric (jaundice like) coloring, or exanthemia, resembling measles, on the chest or neck. The symptoms just described begin to manifest themselves four or five hours after the injection of the curative substance. They last from twelve to fifteen hours. The patient is not much affected by the attack induced by the fluid and after it is over feels comparatively well, even better in fact than before the injection.

The second or local reaction produced by the injection of the fluid in a patient suffering from tuberculosis can best be observed in persons whose tuberculous affections are visible as, for instance, in the case of persons suffering from lupus. The changes which ensue in these cases show, in a surprising manner, the specifically anti-tuberculous effect of the remedy. Within a few hours after an injection of the fluid has been made under the skin of the back, the lupus sores begin to swell and redden. During the fever which the patient experiences as already described, the swelling and reddening of the sores increase until finally the lupus tissue assumes in places a dark brown tint and a necrotic condition. After the subsidence of the fever, the swelling of the lupus sores gradually decreases and possibly disappears altogether within two or three days. Meanwhile, however, the lupus centres have become covered

with an incrustation, formed by exuding serum, which dries up as it reaches the air. These incrustations gradually form into scabs, which fall off after two or three weeks. In some instances the effect just described is produced after a single injection of the curative matter, when a red, smooth scar is left. These changes are absolutely limited in extent to such portions of the skin as are clearly recognized as lupus. In tuberculosis of the lymphatic glands, bone articulations, etc., these local reactions are less striking, but are still clearly perceptible to the eye and touch. In these cases there is swelling of the parts affected, and more pain than lupus patients suffer, while in the parts adjacent to the diseased centres the surface also becomes red.

The reaction produced in the internal organs, especially the lungs, when the curative substance is injected, is not of course open to observation apart from the increased expectoration and cough. In all the experiments after the first injections if any tuberculous process existed in the body the appearances already described supervened. Absolutely no exception was noted whenever a dose amounting to one-hundredth part of a cubic centimetre of the substance had been applied. One may assert with confidence, therefore, that the remedy may be considered an indispensable auxiliary to diagnosis, and in doubtful cases incipient phthisis can positively be diagnosed by its use, even if positive information of the nature of the disease cannot be obtained by the discovery of bacilli, or of elastic fibres in the sputum, or by a physical examination.

Tuberculous affections of the glands, latent tuberculosis of the bones, doubtful skin tuberculosis, &c., can by the use of this fluid be easily and certainly diagnosed. Moreover, in cases of lung or joint tuberculosis which have apparently passed off it will be possible, by the use of the new substance to ascertain with certainty whether the morbid process is really and absolutely ended.

Professor Koch expresses the belief that his remedy will certainly prove a cure for incipient phthisis. Whether,

however, the cure will be final or definite has not, he says, been clearly proved. Further experiments and continued use of the remedy will be necessary to determine this question.

The curative properties of the new remedy, Professor Koch declares, are of still greater importance for diagnosis. What the fluid kills is not tubercular bacillus, but the tubercular tissue. This fact indicates the well-defined limits which the efficacy of the remedy will be able to reach. In other words, it can only influence living tubercular tissue. It has no effect whatever upon dead tissue, such as decayed caseous matter, necrotic bones and the like. More than this, it produces no effect upon tissues which have already been killed by the application of the remedy. It is quite possible that such dead tissue may still contain living tuberculous bacilli. These may then be either expelled with the necrotic tissue, or it may be that under special circumstances they may again invade adjacent living tissues.

It follows, therefore, that tuberculous tissue that is still living must first be made to decay. When this has been accomplished every effort must be made to remove the dead matter by surgery. In cases where this method is impossible and secretion can only slowly proceed by the self-help of organism threatened, the living tissue must at the same time be protected by continual applications of the remedy so as to guard against the reimmigration of the parasites.

The fact that the remedy causes decay only of tuberculous tissues affecting exclusively living tissues explained why the curative fluid may be applied in rapidly increased doses.

After the patient has been under treatment for a period of three weeks a dose of the fluid of 500 times the strength of the original dose can be applied, for at the beginning, when a large quantity of living tuberculous tissue exists, a small quantity of the remedy suffices to produce a strong reaction, but each succeeding injection causes the disappear-

ance of a certain quantity of tissue capable of reaction. It naturally follows, therefore, that increased doses are necessary to obtain the same degree of reaction. As soon as patients treated with increased doses experience as little reaction as non-tuberculous people it may be assumed that all tuberculous tissue open to reaction is dead. Whether this conclusion is correct, time will show. For the present, however, Professor Koch is convinced that this conclusion is a sound one.

In all cases of lupus so far treated the amount of fluid injected has been in the first instance one-hundredth part of a cubic centimetre. Time has been allowed for the reaction to take its full course. After a period of from one to two weeks a second injection of the same amount has been made. This treatment has continued until the reaction grew weaker, and finally ceased. In two cases of lupus of the face the sores after three or four injections became scarred and presented a smooth surface. Each one of these cases has suffered for many years, and had been treated by other methods without beneficial result.

Persons suffering with tuberculosis of the lymphatic glands, bones or joints have been treated with precisely the same success. There has been rapid healing in the milder cases and cases of recent development of the disease, while in several cases the improvement, while slower, has been steady. Patients with pronounced tuberculosis of the lungs have proved far more susceptible to the remedy than those suffering with surgical tubercular affections. Consumptives have in almost every instance manifested a strong reaction on greatly reduced doses. With such patients, therefore, a beginning should be made with doses of two one-thousandths part of a cubic centimetre, or even with one one-thousandth part. From this small incipient dose one can advance to such quantities as the patient can easily bear. In the experiments that have been conducted consumptives have accordingly first received a sub-cutaneous injection of one one-thousandth part of a cubic centimetre.

Then, when the temperature increased, the same dose was applied daily until no further reaction occurred. Thereupon the dose was doubled, two one-thousandths part of a cubic centimetre being injected regularly until again no reaction occurred. This method was continued with almost always an increase of one-one-thousandth part of a cubic centimetre, or at most two one-thousandths up to one one-hundredth part, and so on upward. In this way the patient would be brought to take very high doses almost without fever and almost imperceptibly to himself. Consumptive patients who are still fairly strong reach increased doses much more quickly, and favorable results follow with corresponding rapidity. As a general rule the coughing and expectoration are increased somewhat after the first injections. Then they become gradually less, and in the most favorable cases will ultimately wholly disappear.

In the cases experimented upon under the direction of Professor Koch the expectorations gradually lost their purulent property and assumed a mucous character. The number of bacilli expelled usually decreases only when the expectorations begin to assume the mucous appearance. The bacilli then disappear entirely for a time, but on occasions again appear until expectoration totally ceases. At the same time the night sweats cease, the patients begin to look better and to increase in weight. Patients who have been treated in the early stages of phthisis have all been freed from morbid symptoms within from four to six weeks, when they may be regarded as healed.

Consumptives with large cavities in their lungs will probably only experience benefit from the new remedy in exceptional cases, though most cases show temporary improvement.

Professor Koch deprecates the mechanical and indiscriminate application of the remedy. He holds that it would be preferable that the treatment should be applied in suitable institutions where careful observations would be possible.

Professor Koch says that sufficient experience has not yet been collected regarding tuberculosis of the brain and the larynx and miliary tuberculosis to justify the expression of any opinion in regard to the efficacy of the remedy.

In all cases Professor Koch emphasizes the necessity of early treatment. Only in incipient stages of the disease, he declares, can the remedy fully develop its efficacy.

The Frank Courier states that the lymph used by Professor Koch for the cure of tuberculosis is prepared in an incubating stove within a space that is hermetically sealed and sterilized and thereby rendered free from fungus. The interior of the air-tight space is divided by an unglazed porcelain diaphragm into an upper and lower section. In the upper section is placed a salted meat broth in a gelatinous state containing colonies of the tubercule germ. This mass gradually liquefies and the gelatine liquid drops slowly through the porcelain plate into the lower section. The liquid then contains all the secretory products, but is free from all living or dead germs or reproductive spores, and is the lymph as used.

By the injection of the lymph the tubercule germ is killed, and at the same time the injected particles retain sufficient strength to detach and expel the dead germs, together with the dead tissue. The reparative process ensues and healing follows.

A meeting of the Medical Society was recently held, at which Professor Virchow, the celebrated German physician, presided. Professor Virchow made an address, in which he defended Professor Koch against the charge of having prematurely published the facts regarding his discovery. The first information he gave regarding the subject, Professor Virchow said, was given to the Medical Congress recently held in Berlin, and the disclosures he then made were in compliance with the urgent request of a committee of the congress and Dr. von Gossler, Prussian minister of ecclesiastical affairs, education and medicinal affairs.

Empress Frederick gave an audience to Professor

Koch, who explained to her Majesty the results already obtained from the use of his curative lymph and the benefits he hoped would be conferred upon humanity by its general use.

The Deutsche Medicinische Wochenschrift contains a report of Drs. Bergmann, Frantzel and others on Koch's treatment of tuberculosis. The article, which is written in scientific language, adds little to what is already known. Dr. Frantzel believes that advanced cases need a long course of treatment before the efficacy of the remedy can be shown. He agrees with the other doctors that the greatest value of the remedy is as a means of diagnosis and in the treatment of tubercular skin diseases. In disease of internal organs the remedy is of doubtful efficacy, where cavities are small they may cicatrize, but where they are large, owing to the flow of matter and the presence of other micro-organisms, the wasting process continues and death ensues.

Many foreign doctors have issued warnings to consumptives against undertaking a dangerous journey to Berlin in winter. It is better, they say, for patients to wait for the arrival of the lymph at home, where they can obtain quieter and more careful treatment than is possible in Berlin, which is now crowded with cases.

The Nachrichten says that Emperor William has bestowed the grand cross of the Order of the Red Eagle upon Professor Koch.

Three patients treated by the Koch method are reported dead. They were all in a critical condition before they received the injections.

Physicians are agreed that Dr. Koch's tuberculosis remedy proves effective only in the treatment of mild cases of the disease.

The municipal authorities have resolved to confer the freedom of the city upon Dr. Koch. They have also voted funds and appointed a committee to provide a temporary hospital for his tuberculosis patients and accommodations for his experiments. This measure is taken pending government action in the matter.

ARTICLE III.

THE PREPARATION AND FILLING OF ROOTS AT ONE SITTING.

BY. E. L. CLIFFORD, D. D. S., CHICAGO.

An article in "Items of Interest" under the caption, "I do not indorse immediate root filling," reads as follows: "We can never know that incipient abscess is not present, and, if it is, trouble will always follow such an operation. It is to be deplored that this practice is advocated to such an extent in our periodical literature, on account of the danger of leading young men astray. We should be more conservative in our practice. A root may be filled immediately if we have destroyed and removed the pulp ourselves, but, even in those cases, I would prefer to leave it a day or two, to destroy any living tissue that might remain in the canal. For this purpose I know of nothing better than carbolic acid .95 per cent.

The reason given for the position taken in the above paragraph, and the only reason, is, "We never know that incipient abscess is not present." Well, suppose it is present? What is an "*incipient*" abscess? In medical lexicology I have hunted in vain for an interpretation. The term incipient, I know, is used with freedom by medical writers, and will therefore exonerate the authority quoted from any intention to launch a new word upon our already crowded sea; but as the term has not been thought of sufficient importance to find a place in our special lexicons, I take it for granted that it is used simply in its original and literal meaning. Therefore the term incipient abscess must mean an abscess just beginning, for the word is defined, "beginning, commencing, starting." Now, what has pathology taught us is the beginning of all abscesses? Is it not inflammation? And must not inflammation be preceded by, first irritation, then contraction and dilatation

of the vascular surroundings, followed by hyperæmia and more or less complete blood stasis, to be in turn followed by the various steps consequent upon any inflammation; and let us not forget, at this point, that inflammation does not *necessarily* lead downward through the grade of retrograde metamorphosis to finally reach suppuration, atrophy, gangrene, or death. But remember that life is tenacious; that physiological tendencies, with equal fortune, will invariably overcome and overbalance pathological drift, the inclination of all tissues to return to the normal health status being so great. No. "Inflammation ceases to advance just as soon as the irritation is removed, and the blood, circulating through the vessels, restores their walls to a healthy state. When this happens, *recovery* at once begins. The injury to the vessel-walls being slight, and the exudation trifling, the vessels soon begin to perform their normal functions, and what is effused undergoes reabsorption by the lymphatics, or by the blood vessels themselves."

Now, then, this fact established, should the presence of an incipient abscess debar us from finishing our operation, *if* it has been possible to thoroughly clean and sterilize every portion of the pulp canal and dentinal tubuli, and can successfully reach with our filling material the apical foramen. I think not. The position I take in regard to devitalized teeth is, that there is but *one* object to be accomplished in their preservation; that is to *clean* the roots; and this I believe can, in a majority of cases, be done (I will not say as well), at one sitting than twenty. In using the word clean, I, of course, use it in its most superlative sense, no half way, or "that is well enough," should ever satisfy the honest operator.

If, then, our sole object is to clean the root, it signifies that the root contains something that is unclean and impure. The question then arises, if this unclean and impure matter is contained in the root in what portion of the root does it find a habitat and a lodgment? Is it in the pulp

canal, and the pulp canal *only?* If so, it would be an easy matter to purify and clean all roots presenting, at one sitting. But are we not stubbornly met with the fact that the boundary line of this unclean substance, and its effects, reaches farther than the above suggestion, and therefore that our remedies must penetrate farther to be effectual.

Another question would here naturally arise: Can we follow it, and if so, how? Another digression forces itself upon me at this point, but only for a moment, as I will accept it without comment; that is, to accept the germ theory as an etiological factor in the pathological condition to be overcome. I take it for granted that micro-organisms are accepted as prime movers in all pyogenetic affections, at least until some other theory more plausible is advanced; and from this bulwark will fire the random shots destined for the field of enquiry upon the ground of progressive surgery. Fermentation and putrefaction having advanced sufficiently, the habitat or lodgment of the micro-organisms has, of course, become too small; their products have generated and produced sufficient gaseous substance to more than fill the cavity of the pulp chamber and canal; consequently a hunt for other quarters is their ultimatum. The nearest and most direct outlet we believe they will take and our minds are at once directed to the dentinal tubuli and apical foramen. The tubuli, having been occupied by animal matter, must certainly come in for their share of fermentation and putrefaction and their results, and must so harbor nests of micro-organisms that might revolt at any moment, declare an insurrection, and proceed to wage a merciless war upon the surrounding tissues. For this reason, it will readily be seen that it is not enough to clean and sterilize the root canal proper, but these tubuli must also be emptied, cleaned, dried, sterilized and filled.

As to how this shall be done: My first thought in the procedure of such an operation is, *thorough dryness and complete* protection from any future inundation of saliva, water, or other septic fluid. To gain this, the rubber dam

is brought into play, safely adjusted, and the cavity of decay and pulp chamber relieved of its detritus. Having removed all possible with spoon excavators, and dried as much as possible with bits of amadou, I then saturate the chamber with a *non*-escharotic disinfectant, waiting a few moments, again dry the cavity, and proceed to remove any particles of putrescent pulp within the canal. Should pus already have formed, I use alternately injections of peroxide of hydrogen and an ethereal solution of iodoform, believing that, with these agents, I simplify and render easy what would otherwise be tedious and difficult. I do not know that I have seen a reason given for this alternating of H_2O_2 with iodoform and ether, but, believing that to be scientific, we should have an end to accomplish in each step taken to re-establish a physiological function, or to eradicate a pathological condition I will try to give you my reasons for each step taken.

First, then, we court perfect dryness. Why? Because moisture, warmth and microbes are the three essentials to septic fermentation. Absence of any *one* of these is sufficient to prevent decomposition.

Second, protection from saliva. Why? First, because it is a liquid, and its presence would thwart our efforts at dryness; next, our scientific researches have shown us that saliva contains and propagates, not only all classes of bacteria now known to us, but most of the fungi as well. Not only benign micro-organisms find a flourishing element in saliva, but most of the pathogenetic species also. In fact, nearly fifty separate and distinct foreign and malignant substances have been extracted from the human saliva, ranging from a simple mucous corpuscle to pus corpuscles and all the malign bacilli known to exist within the animal economy.

Third. Why disinfect the cavity of decay? That you may not push into your pulp chamber, and from thence into and through your root canals, the septic matter you know to exist in that habitat; also on the principle of

"an ounce of prevention being worth a pound of cure."

So far we have had a comparatively easy task. We have had only that portion of our root to deal with that we could see or feel. If, however, putrescence has taken place, disintegration has, of course, been established, and it will be impossible to remove the pulp entire, and the process of removing it mechanically is too long and tedious, (especially if the case in hand has more than one root.) What, then, shall be done? It is my practice, after removing all possible in the manner described above, to saturate the chamber and canal with the volatile extract of eucalyptus (made by Sander & Sons, of Australia; I never use any other), and then drying with amadou, to apply chloroform to saturation. My object in doing this is two fold: First, for its analgesic effect; but mostly as a solvent for the oils and fats left adherent to the walls of the canal, and occupying the spaces of the tubuli.

(Although not pertinent to the subject in hand, I will state that if I were not going to fill at one sitting, and wished to accomplish the same end by prolonged treatment to two or more sittings, I should fill the pulp chamber and canals with Squibbs' carbonate of soda, and leave it for three days. I should thereby saponify these oils, fats and extraneous matter with this alkali, and, at the end of the time named, a little warm water would be all required to wash out and clean the root.)

The fatty substance being disposed of, in what condition do we find our organ? Tolerably clean, but we have been compelled to use liquids; therefore we still possess one of the main elements necessary to the growth and propagation of pathogenetic material; *i. e.*, moisture. We insert our cotton, bibulous paper, amadou, and all the other absorbents at our command, but still our work is defective; it is not complete; we have not been thorough, and there is only one element in nature known to me that can be called to our assistance. That element is heat; and although the statement has been made that heat as an antiseptic was

useless to the dentist, from the fact that some scientist had discovered that 212° F., and that maintained for 1½ hours, was necessary to destroy microbes without spores, and that the heat must be increased to 284° F., and maintained from 1½ to 3 hours to destroy the spores. I am satisfied in my own mind, and will endeavor to show, that we do not use heat for its direct antiseptic effect; but it is one of our best assistants towards that end. The statement has also been made, that the perfect drying of a root by heat (such, of course, as can be used in the mouth) will not destroy germs or spores. To all this I bow in humble acquiescence. But, acknowledging the fact, is there no other assistance that heat can render us in accomplishing this end? After drying as well as possible with our absorbents, if we can contrive some method or appliance by which we can carry heat much greater than the normal surroundings of the root into the canal, we certainly can extract from its hiding place all the moisture possible. We certainly know it is a law of physics that no two substances can occupy the same space at the same time. We also know that a superheated instrument, coming in contact with water, will convert it into steam, which is gaseous, and cannot be confined, but must escape; vacuum must be the result. We also know that nature abhors a vacuum, and that these osseous structures, having been deprived of their natural quota of water will seek for and find, if possible, its requisite. Taking advantage of this physical law, we supply the new moisture, first charging that moisture with some element known to be antagonistic to growth and development of pathogenetic elements. I select the ethereal solution of iodoform. The liquid penetrates into all the anfractuosities and diverticula of the bone or abscess; the ether becomes absorbed or evaporated, and the agent is deposited uniformly on the pyogenic membrane, the action of which it modifies, dissolves any oils or fats which may have been left in the tubuli, and leaves the spaces filled with the medicament used. Now, having the root thoroughly

saturated with iodine, I promote further evaporation by warmed air, and take a further advantage of our physical law of suction, and compel the dentine to attract chloropercha solution or oxy-chloride of zinc, whichever material I am using. Of course the less dentine we have in the roots the less disinfecting we are called upon to accomplish; and, if the strength of the organ will permit it, and your sense of touch is sufficiently skilled, I would admit the theory of Dr. Allport, and advise the removal of as much dentine as possible. I should advance, however, in the practice of this theory with caution.

And now to review—are there any impossibilities stated in the foregoing, are there any illogical deductions drawn? You will all recognize the fact that these several steps can be followed in less time, or as much at any rate, as the detailing of them will require, and why shall a patient be required to spend from three days to three weeks in running to our offices when the end can be accomplished in one hour of continuous work. A case in practice comes to mind—a *confrere* resident in one of our suburbs had for a patient a lady about thirty years of age who lived on the west side and consequently a great distance from his office. One of the lower bicuspids had abscessed and the patient had spent her time and money for several months in semi-weekly visits to her dentist with the result that each time the tooth was tightly sealed the inflammation would re-appear. The dentist told her that if she had any trouble after his last treatment to call on me. It was only a few days when the patient applied to me with a terrible sore tooth and considerable pain. After getting a full history of the case I removed the dressing in the root, found considerable suppuration, and after washing out as much as possible I filled the canal with carbonate of soda, and dismissed the patient for three days. (You will recognize that I was dealing with another man's patient and felt that I would take no risks so I gave two treatments). At the appointed time she returned, when the saponified residue

was washed out and a line of treatment similar to what I have detailed above was pursued. The root was filled with oxychloride of zinc and hydronapthol (at that time I had not used chlora-percha) and the crown filled with oxy-phosphate, with instructions to return to her dentist at the end of two weeks and have a gold filling inserted.

Another case—A lad about 18 years presented r. l. bicuspid terribly decayed, jaw considerably swollen, but as he lived within a few doors of my office where I could watch him I wanted him for an experimental case. He wanted the tooth extracted. It was in the forenoon and I had a patient in the chair, so I opened into the pulp chamber when his mouth filled with pus and he was to some extent relieved; I told him to call again at 2 o'clock, which he did, when I adjusted the rubber dam, cleaned and filled the roots and crown. It is now about five months and I see the patient often and he is delighted that he did not have the tooth extracted. Now the question may very properly be asked, from what I have stated, if I would advise the filling of *all* roots at one sitting. Judgment must of course be used in any and all operations of surgery, no matter how trivial they may appear. But I am willing to be placed upon record with the statement that the conditions forbidding the procedure are the exception by far and not the rule. I believe the fact is established, and one upon which there is no difference of opinion at this time, that all aseptic canals are ready to be filled. I, also, believe the fact established that all canals possessing an exit through a fistulous opening in the gum may as well be at once cleaned and filled. Thus you will see these two facts would probably embrace three-fourths of all the canals we are called upon to fill, leaving a small minority about which there would be question. In reflecting upon this minority the principal reason, usually given, that would negative our procedure would be the fact of no existing fistula, or what is generally termed a blind abscess. This fact *alone* I cannot accept as reason sufficient for protracted

treatment, as experience has shown that (though possibly provoking an acute pericementitis for twelve hours or more) in a vast majority of cases the great tendency of nature to reassert herself and the physiological proclivities being so much greater and overpowering the pathological in her effort to return to health, that victory will at last be proclaimed upon the right side, and a complete subsidence of all outward manifestations will be the result. Should I fear however that the vital energies of my patient may be taxed too greatly, I always anticipate and relieve the immediate pressure by establishing what nature has thus far failed to make, an artificial fistula, and prescribing a few doses of some of our newer anti-neuralgics and analgesics.

From the above, what would we conclude to be the essentials to success in root filling? First, perfect dryness; second, no vacuum; and third, as precautionary and preventive, drainage, as in all surgical cases in other portions of the organism. I can say, with the editor of the *Western Dental Journal*, that immediate root filling should not be practiced unless dryness, which is the first step toward an aseptic condition, can be secured; and this condition I believe can as well be secured in blind abscess as in those with a fistulous opening (hæmorrhage excepted). So much so am I convinced of this fact, that I have reduced the conditions to two that would prevent and forbid an attempt to immediately fill a root presenting for treatment. One of those conditions, and the main one, is the impossibility to dry the whole of the dentine. This will be the case at times in persons of a hæmorrhagic diathesis. The other where the tissues are so swollen and painful as to render it cruel to operate at that time. The treatment I can but regard as philosophical and logical. It is but a sequence of a proved knowledge so beautifully illustrated to our society by Dr. Andrews, of Cambridge, at our recent clinic, that the disease is the result of sepsis, and when the septic condition has been removed, and its place taken by an impermeable and indestructible filling, a certain

cure must result, just as certainly as if the canal had been obliterated by the extraction of the tooth. Any remaining products of the once-existing irritant will speedily be absorbed and changed into healthy cicatricial tissue. One condition may exist that would retard and probably prevent a subsidence of all irritation, and that would be the presence of necrotic tissues either in the root or maxilla. In the successful treatment of this condition, however, the passage through the root is not essential, and would not debar me from filling the root, as I would continue the necessary treatment through the gum, and expect, in time, a recovery.

The question also arises, if it is deemed hazardous to immediately fill these canals, why is it? What would result? What could result? Well, although the past life of this subject is short, there is hardly any pathological condition that has followed an operation that has not been attributed (not to the filling of the root, not to the existence of an almost foreign substance embedded in the tissues, not simply to dental irritation, but) to *immediate* root filling. A case is reported in the February number of the *Archives*, in which considerable mischief is said to have resulted from *immediate* root filling. The reporter of that article starts out by saying that the patient was served by a *fine* operator, and winds up the facts of his statement with the remark that "the other tooth was *reamed out* and filled." Well, if this reporter has told the whole truth, and nothing but the truth, about the operation, I do not see how any but unfavorable results could be expected. *Reaming* out and *digging* out are certainly not very euphonious terms to the professional ear, and certainly cannot be said to constitute the necessary steps to any surgical precedure; so that, if the statement can be borne out by the facts, the results were certainly not from *immediate* but from *imperfect* root filling, which may have occurred in any case treated for months.

As stated before, almost all varieties of reflex and disseminate neuroses have been attributed to this operation.

You all remember a case presented to this society only a few meetings ago, and reported as a result of immediate root filling—a case of alopecia areata. Now, although in the highest degree probable that alterations, and particularly shedding of the hair, may at times be dependent upon nervous influence, yet exact proof of this fact is still wanting. The affection, according to late investigators, is considered as a tropho-neurosis. Experiments have been made, and clinical observations recorded with reference to the influence of disturbances of nutrition, and also of psychoses, upon the condition of the hair; but the data so far obtained is extremely deficient. Joseph has asserted that such a thing as a distinct bundle of trophic nerves does exist, and also that he can produce a circumscribed alopecia in cats by the extirpation of the spinal ganglia of the second pair of nerves of the neck, together with portions of the neighbouring posterior and anterior roots. While these observations thus far made, taken singly, would not be convincing, yet, viewed collectively and in connection with the physiological experiments, we seem to have strong evidence of the tropho-neurotic nature of circumscribed alopecia. Hence it would appear that any irritation reflected to the trophic centres might result in this condition, especially so when we notice that headache is one of the commonest premonitions of alopecia. Cases have also been reported in which heredity was an etiological factor in alopecia areata; and when the neuropathic predisposition is present, very slight influences are enough to cause the appearance of some nervous disease. The most prominent causes, however, are the traumatic and the psychical, and it is not astonishing to find the disease following either of these causes, when we reflect that it is only the merging of a hereditary proclivity. The question of age has also entered into the inquiries upon this subject, and 12½ years was found to be the average at which the disease appeared; so it has been suggested that it is in some way connected with the second dentition and puberty;

but the fact is not established, and at present we are only certain of one condition dependent upon the trophic nerves, and that is the suspension of their activity, giving rise to subsequent atrophy.

The foregoing may indeed seem a digression to you, but it has proved interesting to me to collect these facts, in order that we might more thoroughly understand the etiology of a pathological condition reported to us as a result of immediate root filling.

I am satisfied the reporter of the case did not intend to convey the impression even that the disturbance was caused by the abstract fact of *immediate* root filling, but that it was the effect of an ill-judged dental operation, resulting in a dental irritation, reflected through the sympathetic ganglia to the trophic centres, and arousing in the case presented, a predisposed hereditary proclivity. I have too exalted an opinion of the diagnostic powers of my friend, not to take this view, especially as I could report another case similar of a young girl who glories in the possession of two bald spots, about the size of a silver dollar, upon the right parietal region, which ceased to enlarge, and again began to be supplied with a new growth of hair after the extraction of an upper molar tooth (which had never been filled) and a few visits to the Sutherland sisters.—*Dental Review.*

ARTICLE IV.

DEFORMITY OF FACE TREATED WITH APPARATUS.

L. P. Blair, D. D. S., describes in the *International Dental Journal*, the following very interesting case.

A young woman, twenty-six years old, came to him with a very peculiar condition of face. The portion which extends from the median line of the lips to the angle of

the mouth and from the infraorbital canal to the mylohyoid ridge, was entirely gone. She desired to know if he could do anything for her. Up to the age of six years she had been perfectly healthy; at that time she was taken with typhoid pneumonia. The physician in attendance gave calomel and quinine; forty-six hours after which a blue spot was noticed on the inside of the cheek. The next morning it was visible on the outside of the face, and before night the portion of her face extending from the eye to the condyle of the jaw and along the mylohyoid ridge and median line of the face developed a line of sloughing, and in a few hours entirely dropped out, exposing the bones. The temporary teeth dropped out and the motion of the jaw ceased and it became ankylosed.

The young woman had had two attempts made with plastic operations, both of which were only partially successful. When she applied to Dr. Blair the lateral, canine and two bicuspid teeth in the left superior maxilla had been removed in order to allow her to eat, drink and articulate. For twenty years she had lived, eating through that small aperture.

She wanted to know if something could not be done to hide that ugly gap. Dr. Blair told her he thought it possible. First he took a plaster cast of the face and molded paraffine and wax upon it until he had the face as near perfect as he could get it. He then took a cast of the face and obtained his die. He next placed sheet wax upon this and forced it into position, thus getting a skeleton form; then trying it upon the face, he found it to be correct. He subsequently made two crowns to fit the lower bicuspids and placed them in position; then two bands to fit upon the crowns in the form of spring clasps, leaving an arm from each extending through the wax form. These arms he fastened securely and removed the form with the clasps in position. Having now the model he desired, he inverted in plaster and proceeded as in plate-work. He rough-finished and sent it to an artist to be painted. The

artificial portion of the face was made of pink and brown painted. He simply filed off the outside, polishing thoroughly the inside.

The result was that the young woman had a false part that so nearly resembled the other side of the face that none but the very observing would notice any difference. This fixture obstructed the aperture for feeding; to obviate this difficulty Dr. Blair removed the right centrals, laterals and canines in upper and lower jaw, thus allowing the patient to eat, drink and articulate without removing the appliance. When he reported the case she had been wearing it five months with perfect satisfaction. His report is accompanied by excellent photo-lithographs which show the face before and after the operation, and show a very remarkable and successful result.

ARTICLE V.

AFFECTIONS LIKELY TO OCCUR IN THE ALVEOLAR PROCESS.

Under this heading Dr. Shurer contributes a short article to the *Dental Register* for May. He considers one of the most important factors in the production of pathological conditions of the alveolar process is a diseased condition of its lining membrane—the periosteum. Speaking of necrosis, he says that there is reason to believe that the process of exfoliation is effected by the action of a corrosive fluid poured out from the fungous granulations of the living bone in contact with the necrosed part. "Necrosis of the alveolar process occurs very frequently while the system is under the influence of mercurial medicines, and during bilious and inflammatory fevers and certain other constitutional diseases, as syphilis, scurvy, smallpox, &c., and may also result from mechanical injuries. In many cases, es-

pecially of chronic disease, there is a definite thickening of the alveolar wall at or near its margin, which is clearly the result of exostosis, brought about by irritation in the immediate neighborhood. In most, if not all, of these cases, the peridental membrane will be found destroyed between this thickened rim and the root of the tooth, and if the gum be slit up and turned back, it is seen that the portion of the alveolus lying next the teeth has been absorbed. We thus have an absorption of the inner portion of the alveolar wall and at the same time a deposit of bone on the outer portion, which causes the gum tissue to be held away from the root of the tooth. This thickening of the rim is very irregular, but seldom fully encircles the teeth. And as the destructive process is going on beneath this thickening of the bone, there will often be found jagged prominences that will interfere with the healing process, unless removed. The destruction of bone in these cases seems to be a process of absorption. A tooth is occasionally slowly forced from its place by a deposit of bony matter at the sides, or more generally, at the bottom of the socket, causing a gradual displacement of the tooth. The causes are not rightly understood, though it is believed to be due to some irritation of the peridental membrane which seems to be so susceptible to morbid impressions that the pressure of a very conical root may be sufficient to produce this effect, or the pressure of a tooth possessing only a very low degree of vitality.

The writer of the paper connects this class of cases with those in which absence of all pressure causes alveolar exostosis, as, where a tooth has lost its antagonist and becomes elongated in consequence.—*London Dental Record.*

Communications.

THE CALIFORNIA STATE BOARD OF DENTAL EXAMINERS, AND ITS INFLUENCE ON DENAL EDUCATION.

Editor of the American Journal of Dental Science:

An essay was read before the Southern California Odontological Society at the fifth annual meeting, October 14th, 1890, by Jno. C. McCoy, D. D. S., of Santa Ana, Cal.

The motto of American dentists has ever been "Excelsior," never satisfied with past wonderful improvements, ever pressing onward and upward to a proficiency not even dreamed of by the most advanced of the past generation.

Dental Colleges have aided largely in raising the standard of the profession. In order to compel all to attain sufficient knowledge before practicing, but most of all to protect an innocent and over-confiding public, our Legislatures have enacted laws to regulate the practice of dentistry.

The title of our California law as approved March, 1885, is as follows: "An act to insure the better education of the practitioners of dental surgery, and to regulate the practice of dentistry in the State of California."

The Governor appointed seven practicing dentists of our State to carry out the provisions of our dental law.

Now be it understood that the object for which this "State Board of Dental Examiners" was created, was "to insure the better education of the practitioners of Dental Surgery."

In other words, they were intrusted by our State with the important mission of protecting her citizens from the malpractice of unqualified practitioners of dentistry, that is,

so far as the qualifications of those who applied to them for certificates to practice dentistry in the State of California were concerned.

This Board of Dental Examiners has been meeting for examination of candidates for five years. Their work is open to inspection of the public, and now we want to inquire what has been the influence of this Board on dental education.

1. The examinations have been theoretical and not at all practical. The first course student of a dental college with scarcely any practical knowledge is placed side by side with the experienced practitioner, and both subjected to a written examination without an opportunity to show by clinical demonstration their practical knowledge.

No member of this State Board of Dental Examiners could state on oath whether any applicant could properly perform even the simplest operation; one young man who successfully passed the examination boasted that up to that time he had never made a set of artificial teeth.

The position of our State Board of Dental Examiners is perhaps unique, it probably being the only one in the United States opposed to the better education of the dental practitioners.

Knowing that the above is true, we would like to ask, how much this act insures the better education of the practitioners of dental surgery?

2. We will examine the attitude of the State Board of Dental Examiners towards the Dental Department of our State University. Our State Dental College is worthy the encouragement and patronage of every dentist of this State; and is really doing all that is being done educationally on this Coast. This College has adopted a high standard for its graduates. To graduate from our State Dental College means a thorough training in all branches of dentistry.

Now this same State Board of Dental Examiners is antagonistic to the Dental College. A State institution and

working under the same authority. In short they grant certificates to practice to students who have failed to pass required examinations in the college; thus they send forth unqualified practitioners, deceiving the people, being clothed with all the legal rights of a competent and educated dentist.

Please remember the purpose for which this Board was created: To insure the *better education* of the practitioners of dental surgery.

They have not only failed to fulfill their mission, but have been and are obstructionists, and have prevented the very thing they were appointed to promote.

3. Has this Board co-operated with the profession of the State to secure the end for which they were appointed, viz: To insure the *better education* of the practitioners of dental surgery?

This Society believing that the law regulating the practice of dentistry could be improved, and that the State Board of Dental Examiners was guilty as charged in a former part of this paper, appointed a committee to confer with a like committee of the "State Dental Society" with reference to amending the dental law so as to limit the power of the Board to the examination of diplomas.

The State Dental Society, (the leading members of which are on the Board of Dental Examiners,) referred our petition to the said Board, a distinction without a difference, who, presumably fearing their power and authority would be limited by such a change in the law, paid no attention to our requests, and by so doing refused to co-operate with those interested in insuring the better education of the practitioners of dental surgery.

Our evidence is all given, our argument is made. The case is before you and the profession of our great State shall be the jury. We will leave them to decide the influence our State Board of Dental Examiners is having on dental education.

GEO. E. PURNELL, *Cor. Sec'y.*

THE KANSAS CITY ACADEMY OF MEDICINE.

KANSAS CITY, MO., NOV., 14th, 1890.

Editor of the American Journal of Dental Science:

The "Kansas City Academy of Medicine," incorporated last July, now has all the active young medical men of Kansas enrolled as "Fellows." In order to carry out the object of the Academy, a good Medical Library was indispensable and the majority of the "Fellows" being young men of limited means we reached out and asked our teachers and authors of medical books, as children ask their parents, for help.

Almost every author sent copies of their books and as a result, the Academy now has about 150 volumes of standard medical works.

The publishers of the leading medical journals, (about 100,) have each promised to send copies of their journals to to the library rooms gratuitously. The liberality of our teachers and authors has placed us on a good financial basis and we have secured permanent quarters.

If you will contribute to the Library we will be very grateful. Yours truly,

JAMES P. PARKER, M. D.,
Chairman of Library Committee.

CHAS. B. HARDIN, M. D., *Sec'y.*

Editorial, Etc.

THE BALTIMORE DENTISTS AND THE CENSUS.—Many of the dental practitioners of Baltimore City have protested against the questions propounded by the special agents who are collecting manufacturing statistics, and several of them have visited Washington to endeavor to convince Superintendent Porter that dentistry is a branch of medicine, and not a manufacturing interest; but, apparently, without success. Dr. Richard Grady, in an article prepared for a daily paper, represented this case as follows: "The prevailing idea that the

gold filling and the artificial denture are as legitimate objects of barter and contract as any other tangible object of manufacture has led the census office at Washington to interpret the term "mechanical dentists to embrace all branches of the profession except the extraction of teeth." Mercantile relations of cost and price are capable of definite adjustment when applied to commodities of known values enhanced by labor at given rates, but professional service is amenable to no such standard. Dentistry is the science and art of medicine applied to the dental organs, and the fee is a valuation of thought and skill. The anatomy, physiology and pathology of dentistry differ in no respect from that taught in medical schools. Dental therapeutics, however, includes a class of operations not taught in medical schools and not practiced in the offices of physicians and surgeons. Hence by universal consent this branch of therapeutics, under the name of dental surgery, is assigned to a special class of practitioners.

"The distinguishing feature of dental therapeutics is the art of replacement—replacement of dental *structure*, replacemet of dental *organs*, which may be classified as dentistry of the chair and dentistry of the laboratory. As medicine and surgery are combined in the practice of the majority of medical men, so the two classes of prosthetic mechanism are usually practiced together, and such practice is in a larger number of cases unavoidable. The element of mechanism and the necessity for the exercise of handcraft enter more or less into all special sciences. Astronomy, chemistry, pharmacy, microscopic analysis and modern medical diagnosis demand extreme accuracy of manipulation, and all great discoveries in these sciences displayed the ability not only to use, but also to invent and construct apparatus.

"The universal recognition of the great value of this element in every department of physics has given the scientific world a correct idea of the true dignity of highly-educated mechanical skill—skill without which the physician's art is crippled, surgery becomes impotent and dentistry has no existence. No science or art except chemistry has been so eminently progressive in recent years as dentistry, and it is second in importance and extent of its usefulness to no speci-

alty of the great art of healing. It requires the talent that would make a good physician, the talent that would make a good surgeon, the talent that would make a good mechanic, and the talent that would make a good artist."

Acting Superintendent Childs, of the census office, decided practically that the protest of the Baltimore dentists against the questions being propounded by the special agents who are collecting the manufacturing statistics is without sufficient basis to justify a compliance with their requests to be left out of the list of manufacturers to be enumerated. According to Mr. Childs and Mr. Williams, the chief of the manufacturer's division, the reluctance on the part of the dentists to answer questions arises from a misapprehension concerning the use to which the information they are required to give is to be put. In the compilation of the statistics no names are to be used, nor any information that could affect the interests of any individuals.

Dr. Grady thereupon replied as follows: "The interpretation given by Mr. Williams to the term mechanical dentistry, namely, 'That branch of the profession which includes the manufacture of artificial dentures, such as plates, crowns, caps,' modifies that given September 23, 1890, by Chief of Division Boudinot to Chief Special Agent Creager: 'You are informed that the term is considered to embrace all branches of the profession except the extraction of teeth.' The census office is in error in claiming that 'at the census of 1880 * * * opposition was uniformly withdrawn when proper explanations * * * were made to the persons averse to giving the information required.'

"The facts are that the superintendent of the census of 1880, upon the representation made to him by the chief special agent of New York 'of the general reluctance of the profession to give the information contemplated by the schedule,' and upon the presentation to him of a 'protest against the novel and unjustifiable demand made for reports from dental practitioners,' determined to omit from the tabulations 'dentistry in *all* its branches.' If, as the result of this decision, all the schedules in the New York office were 'indorsed in this effect and respectfully returned to their respective makers,'

where did the tenth census get the various statistical items relating to mechanical dentistry? Again, referring to the figures of that census, the number of establishments noted for Baltimore is 14, which would imply that but one in ten of 141 dentists whose names are given in the Baltimore City Directory for 1880 manufactured artificial dentures, crowns, caps, &c., whereas it is well known that such work is done by the majority of the profession."

A meeting of Maryland dentists was held Nov., 1890, at which it was determined to resist such action as that contemplated by the census officials, and the following is the latest phase of the matter:

The determination on the part of the Maryland dentists to refuse the information requested of them by the manufactures division of the census office, on the ground that dentistry is a liberal profession and in no sense a manufacturing business, is another thorn in the side of Superintendent Porter. He had not anticipated further trouble after the explanations made by Chief Clerk Childs regarding the matter several weeks ago. Concerning the dentists' contention that dentistry is a branch of the healing art, and not a manufacturing business, Mr. Porter said: "I know that just as well as they do, and so far as the census office occupation tables are concerned, all dentisis will be classified as professional men." The objections which were being urged by dentists against including as manufactures any part of their operations seemed, he said, to arise from a misapprehension or misunderstanding of the real object or intention of the office. It is not the purpose of the office to include in the tables of manufactures all operations of the dental profession, but simply the operations of that branch which include the manufacture of artificial dentures, such as plates, crowns, caps, &c., which are manufactured wholly or in part outside of the mouth and afterwards inserted. "There can be no doubt," he claims, "that such features of the profession are clearly within the limits of the census inquiry relating to productive industries, and as such are, under the law, to be included in the tables of manufactures. To omit them would be doing a serious injustice to industries of places like Philadelphia, Baltimore and other

cities where this branch of manufactures is such an important element. Not only so, but all this information was collected for the tenth census without a single complaint being made, and included such items as number of establishments, capital invested, number of hands employed, wages paid, materials used and value of products. I feel sure," added the superintendent, "that the dentists of the country, as soon as they understand the purpose of the office in this matter, will see that it is really to their advantage and to the benefit of their profession to answer the questions on the schedule sent to them, and in doing so they cannot in any way impair the high position they now hold among the professional men of this country."

While the census law provides penalties in cases where information is refused in the manner proposed by the Maryland dentists, it is not Mr. Porter's desire, nor does he now believe it will become necessary, to resort to this portion of the law in order to secure the information required. He is sanguine of settling the difficulty without testing in the courts the validity of the census act.

Monthly Summary.

PRIMARY ANÆSTHESIA IN MINOR OPERATIONS.—Dr. F. B. Harrington, M. D , in the *Boston Medical and Surgical Journal*, refers to the need of an anæsthetic which shall be suitable for minor surgical operations of short duration, and in which the after effects shall be but trifling. He believes that the brief duration of nitrous oxide anæsthesia makes it unsuitable for minor surgical operations, although it is rapid and safe of application. Chloroform he has never used. Cocaine, though of use in many cases, is not without danger and sometimes fails. Profound ether anæsthesia requires time and previous preparation of the patient, and the after-effects are often very tedious. He has for these reasons made use of

"primary ether anæsthesia for the last three years in several hundred surgical cases, and has never seen any ill effects from the use of ether in this way. The method has been perfectly satisfactory in over 90 per cent. of the cases. Vomiting rarely occurs. Statistics of his cases show that from 6 to 73 inhalations were necessary for the production of anæsthesia, occupying from 20 seconds to 7 minutes; the period of insensibility lasted from 25 seconds to 6 minutes. The following is his description of the method of procedure he has adopted:

As far as is possible in a short time, the confidence of the patient is gained. They are told that a few breaths will make them insensible to pain and that in a few minutes they will be in a condition to go home. Women and children are, as a rule, less alarmed if they are allowed to inhale the ether in a sitting posture. The effort of keeping erect takes the attention and the position is less suggestive of complete helplessness. This is not a desirable position for strong men unless they are held in by a strap. It is well always to have assistants at hand, although a large number of cases might easily be handled alone. An ounce or more of ether is poured on a sponge or towel. This is given to the patient with directions to breathe rapidly and deeply.

It is important to teach the patient how he is to breathe before applying the ether. I tell them to breathe as a dog pants. The rapid and moderately deep breath I think is the best one, not only for rapid primary anæsthesia, but also for the induction of profound anæsthesia. It is a well-known fact that rapid breathing of air itself produces a certain degree of anæsthesia. Another reason for rapid breathing is that there is a tendency to continue any muscular act in an automatic way after consciousness of the act has ceased. We see this in the repeated use of certain words or phrases, or the continuance of a motion of the leg or arm. I often see patients wholly unconscious of pain breathing at the rate of 40 per minute, the impulse to such breathing having been given during consciousness.

The tendency is naturally toward slow breathing and much more time is required if the breathing be slow. The sponge should be held a short distance from the face and should not cause coughing.

After a dozen or more rapid breaths the operator asks the patient if he is ready. This is repeated until the patient answers "yes" or there is no response. If but an incision or two is necessary, the ether is at once removed; if more time is required the ether is applied for a few seconds longer.—*Med. Review.*

EUPHORINE.—Under the name of euphorine Dr. Sansoni describes the physical and therapeutical properties of a new compound which, chemically, is phenylurethan. It is a white crystalline powder, with a faint aromatic odor and a slight taste suggesting that of cloves. It is sparingly soluble in cold water, readily dissolves in alcohol, and is best administered in white wine, in which it is easily dissolved. Given to healthy men, in doses of from 1½ to 3 grains, euphorine has no apparent effect upon the pulse, the respiration, or the temperature; and in dogs large doses do not lower the blood-pressure, as determined by the manometer. Still more important is the fact that it causes no changes in the blood—in animals the blood remaining normal even after toxic doses have been given. Clinically, Sansoni finds that euphorine possesses valuable antipyretic, antiseptic, antirheumatic, and, in some cases, analgesic effects. As an antipyretic, he has employed the drug in fever from various causes, such as typhoid fever, croupous pneumonia, phthisis, acute rheumatism, pleurisy, orchitis, influenza, etc., administering it either as a powder or dissolved in wine. The fall of temperature begins within an hour after the administration, reaches its maximum usually in about three hours, and continues, as a rule, for from five to seven hours. In some cases the fall is more brief, and in a few it continues for fourteen hours. The subsequent rise of temperature is usually sudden and accompanied with a chill, the duration and severity of which are proportionate to the intensity of the disease. During the period of apyrexia the patient has a feeling of well-being. Cyanosis is seldom observed, and the pulse and respiration are regular. The antipyretic effect

varies in different persons, and it is best to begin with a small dose (1½ grain), increasing until the proper amount is determined. To most adults, from 15 to 22 grains can be given daily without producing harmful effects, its antithermic power being about twice that of antipyrine. In rheumatism, both acute and chronic, the doses of euphorine should be larger than those given to reduce temperature. From 22 to 30 grains, or even more, should be given daily. In acute rheumatism the good effects appear very soon after the drug has been administered; the temperature falls, and the pain, whether due to inflammation or to the pressure of the swelling, disappears. As an analgetic, euphorine is very useful in orchitis, less so in sciatica, lightning pains of tabes, and trigeminal neuralgia, and is almost useless in intercostal neuralgia and migraine. The observations that carbolic acid is formed, when euphorine is brought in contact with an alkali, led Sansoni to test its antiseptic powers, which, in the case of an obstinate ulcer and one of chronic ophthalmia, he found were excellent.—*Medical News*, October 11, 1890.

WANDERING RASH ON CHILDREN'S TONGUES.—At a recent meeting of the Calcutta Medical Society, Dr. Towers showed a case of this kind. He said it was a condition of the dorsum of the tongue which has only of late years been differentiated as a distinct affection. Other names for it are "ringworm, circular exfoliations, geographical tongue, etc." It is well described and depicted in Butin's "Diseases of the Tongue." The characters of the rash are, that it is met with chiefly in children, that it seldom gives rise to disagreeable symptoms, that it is unaffected by treatment, that its area and distribution are subject to constant changes, that it is apt to persist for a long time, and ultimately to disappear spontaneously. It consists of one or more circinate patches on the dorsum, of various sizes, separate, or confident, smooth, red, and on the same level as the surrounding surface, with a distinct whitish or yellowish border. The filiform papillæ have been shed,

but the fungiform distinctly remain. Rings may form within rings. It commences always on the dorsum. On account of the few subjective symptoms it is usually discovered by accident. The cause of the disease is unknown, but it appears to be associated with debility. It has to be differentiated from syphilitic mucous patches, leucoma, and icthyosis. In syphilis the patches are distinctly raised above the surrounding surface and are grayish upon their surface, and there are present other signs of syphilis. Leucoma is a disease of adults, and consists of pearly patches with red borders and bases. Moreover, leucomatous patches do not change from day to day. Icthyosis is also a disease of adults, and consists of patches of hypertrophied filiform papillæ, while just the opposite condition obtains in this affection.—*Indian Medical Gazette.*

A LOCAL ANÆSTHETIC FORMULA.—An Exchange says: Local anæsthesia is produced at one of the leading hospitals by means of a spray composed of 10 parts of chloroform, 15 parts of ether and 1 part of methol. After one minute's application of this compound spray, complete anæsthesia of the skin and neighboring tissues is produced and will persist from 2 to 6 minutes. This suffices for some minor operations, such as openining an abscess of the cervical glands, incising a deep-seated whitlow, or excising an epithelioma of the nose, etc.

NORMAL WEIGHT OF MAN.—A rule to determine the normal weight of man is as follows: A man should weigh just as many kilogrammes as he measures centimeters in height, after deducting one meter. A man who measures in height 1 meter 80 centimeters (5 ft. 11 in.) should weigh 80 kilogrammes, or about 160 pounds. The rule is both ingenious and approximately correct.

DANGERS OF SALIVATION FROM CALOMEL AND ACIDS.— 1. All the alkaline chlorides are incompatible with calomel, and we should, therefore, forbid all salt food after a dose of calomel has been given.

2. In certain diseases calomel is prescribed in fractional doses at the same time that the patient is taking iodide of potassium; now, as this salt causes the conversion of chloride into the bichloride, it is the wiser course not to have the two drugs together in the stomach.

3. Calomel should never be prescribed in the same mixture with preparations containing hydrocyanic acid, such as cherry-laurel water and the like.

Some forbid all acid drinks after a dose of calomel has been taken; but as acids convert this salt into the bichloride only when they are in concentrated hot solutions, this precaution seems hardly worth observing.—*Med. Record.*

COCAINE ANÆSTHESIA OBTAINED BY MEANS OF CATAPHORESIS.—Dr. Arthur Harreis (*Lancet*, October 25, 1890) writes that where local anæsthesia is required, cocaine hydrochlorate, administered by means of cataphoresis instead of hypodermically, should be employed. In a number of cases in which he adopted this method the anæsthesia was complete, and toxic symptoms of the drug were not observed. He uses a 10 per cent. solution of cocaine, with which the flannel-padded positive electrode, corresponding to the size of the area to be anæsthetized, is saturated. The large negative electrode is soaked in salt solution and placed in a suitable position on the surface of the body. A continuous current of twenty-five milliamperes is then passed for forty minutes. Dr. Harries believes that the causes of failure with this method are: That the currents used are too weak, and applied for too brief a time; that the operator does not understand the apparatus, and that a reserved current is used.—*Med. News.*

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ARTICLE I.

HOW TO INTRODUCE A GUTTA-PERCHA FILLING.

BY DR. MERIT WELLS, INDIANAPOLIS.

We suppose first that the cavity has been properly prepared, protected and dried. First, take a piece of gutta-percha a little larger than will be required to fill the cavity. Warm gradually and shape it into a pellet or bean shape, being careful not to burn the gum. Use dry heat (on a heated slab or by passing rapidly back and forth through the flame of a lamp). When the gutta-percha is pliable, take a smooth spatula or blunt instrument and press the mass into the cavity till it is too full. If the gutta-percha seems to be unyielding before the cavity is full, heat the instrument slightly and apply till the gutta-percha becomes pliable. When the cavity is full allow the filling to cool, then heat the instrument and press near the center of the filling. Press the instrument away from the center down to the surface of the opening and off, carrying

away the surplus. Then allow the gutta-percha to cool and again heat the instrument and press in the opposite side of the cavity similarly. Cool again and thus treat the whole surface of the filling. Avoid pressing backward and forward, as thus you get the filling to playing or rocking in the cavity. In case the nerve is exposed or nearly so, shape enough material to fill the whole cavity in such a way that a rounded, smooth point may be brought in contact with the exposed nerve or sensitive point. The cavity being all ready (dry, etc.), heat the point of gutta-percha which is intended to touch the nerve or sensitive point till it is pliable, then press the surface against a smooth surface, making the gutta-percha surface smooth and cool at the same time. Then press the gutta-percha to place quickly and gently till the bottom is reached, leaving no space; then rest till the material has cooled, then proceed to fill as described before, being careful to keep the gutta-percha as cool as possible to work, as the heat is liable to cause pain and inflammation in the pulp. When the patient winces at the first touch of the gutta-percha at the bottom of the cavity, you may know you have touched the nerve, and no more pressure should then be made till the mass cools, else you might cause the gutta-percha to press in upon the pulp and thus cause pain and failure.

In filling roots press in place the softened mass large enough to fill the pulp chamber. Then with smooth broach heated, press through the gutta-percha into the root; rotate the instrument and withdraw, and insert again rapidly; each thrust carrying on the side of the broach a portion of the gutta-percha into the root. Heat the broach as it gets cool and thrust again till the root is full. The advantage of the large mass at first is that it holds to the side of the cavity and prevents the instrument from pulling the gutta-percha out of the root as you withdraw it. The gutta-percha tends to hold to the heated instrument more than to the walls of the cavity. But the surface of the walls of the cavity being greater than that of the instru-

ment, the latter may be rotated and withdrawn, leaving the gutta-percha in the root.

DISCUSSION.

Dr. Chappell. On the subject of filling teeth with gutta-percha, the first point to consider is the necessity of filling with gutta-percha. The doctor only spoke of filling teeth with gutta-percha, irrespective of the conditions. To know when to fill teeth with gutta-percha, I regard as one of the most important questions.

Dr. Wells. I only spoke of how to introduce it.

Dr. Chappell. I speak in regard to gutta-percha fillings. It is always best first to consider when it should be introduced. Of course, the question of how to introduce it is another matter. To confine the subject to how to introduce the filling, of course, would make it rather shorter. I should burnish my gutta-percha with a warm instrument, and also the surface of the filling after I have properly dried it and given antiseptic treatment, and use the warm instrument until it becomes plastic. Burnish the gutta-percha against the walls of the cavity so as to form a lining, and then introduce my particles smaller than you do, from the fact that I wish to have all the air excluded and wish to know that each particle that I place in the cavity goes to its place. In filling with gutta-percha, like when we bridge the filling with gold, we know that in the use of it the gutta-percha sometimes is not properly prepared. If we place a great quantity of gutta-percha in a tooth it has a tendency in a short time to bulge; that is one trouble with it. If the filling is soft the gutta-percha will puff out, so that it becomes necessary for us to use top dressing. The best thing that I have used to secure the walls with is adhesive gutta-percha. We can frequently take the gutta-percha out of a tooth and find that the walls there are disintegrated. If we will examine the filling of the tooth still further we will find that the filling is bulging, and that there is more or less recession or withdrawing

from the walls of the cavity. To keep the gutta-percha filling in good shape depends on the manufacture; that is, it depends on the quality of the gutta-percha. In filling roots of teeth I have quit filling the pulp chamber proper with gutta-percha and then putting on plastic filling on top of that, from the fact that I think I get better results by going further down with oxyphosphate or even with alloy. I desire to have the alloy placed down low enough so that there will be an anchorage by making a crown of that character, by making an anchorage in the pulp cavity, and if it is a gold filling I prefer to go lower down and make the anchorage with oxyphosphate or with gold, on account of the difficulty of bulging. The earthy matter that is introduced into the gutta-percha holds because it will hold its volume. A great deal of our gutta-percha that we have now is so adulterated with a substance near akin to gutta-percha; I forget the name now, but it has entered into the composition of our gutta-percha work. I think Dr. Caulk is making about the best gutta-percha that we are using. I had some of Dr. Flag's at one time; it was hard cement and hard gutta-percha, and seemed to me the best thing I ever found, but as a reliable gutta-percha I think Caulk's seems to give the best satisfaction. I think it was the diamond cement. It was incorporated into the other substances. I think for temporary filling there is nothing better than gutta-percha, and I fill with it almost exclusively.

It is a very hard matter for me to say anything about gutta-percha fillings unless we discuss the condition of the tooth, and the absolute necessity for the use of gutta-percha. As to the application of hot gutta-percha over an inflamed pulp, or rather open pulp, I introduce the gutta-percha very close, if not in actual contact, not only with the fibril life, but with the pulp, as a condition itself without much danger of pain. But they must be thoroughly dry and in good shape. There must be no pressure upon the nerve; if there is we will have pain. There is a vas-

cularity about the walls of a pulp chamber that we hardly appreciate sometimes when we are placing a filling; that is, we are so near to that membrane that while there is an ossiffic deposit over it so that the dentine will press down, there will be some ache about it to a certain extent, and the fibrilla there are so close in contact with the pulp that they will take on irritation. Gutta-percha, of course, in such case is the best substance we can possibly use, on account of its being nearer the normal condition than any metal. As a general filling in a perfect tooth, and without irritability, gutta-percha, I think, is the best filling we can use. Each operator, of course, has his own peculiar ways of introducing a filling for expedition and convenience.

Dr. Frank Overholser. I would like to ask Dr. Wells what method he uses in heating gutta-percha?

Dr. Wells. Pass it through the flame of a lamp.

Dr. Overholser. Do you find that it sticks to your pliers very much and makes it hard work?

Dr. Wells. No, sir.

Dr. Overholser. That seems to be the greatest difficulty I have with gutta-percha. It sticks to everything that we touch, and sticks to my pliers.

Dr. Wells. I do not think it is necessary to get the whole mass soft. Turn it over as it comes in contact with the cavity, and becomes adapted to the walls of the cavity. If the center of it is not soft it will not make any difference. That will press the soft part into shape, and it cools so much the sooner. The larger the mass you have, the more heat there is in it that must be dissipated. Sometimes in filling, when the center part is cooled and the surface soft, you press that center which is hard, against the softened surface as it becomes fitted to the wall, and it will cool quicker. There is one trouble; you have so much heat in there that it produces pain, and it will continue until it cools off. When I go to fill on an exposed pulp, I use a piece of gutta-percha that is larger than where the pulp is

exposed, and I heat and press it upon a surface that is smooth, rotating it so as to give it a kind of rounded surface, and at the same time that it is being rounded and smoothed it is being cooled, and that surface is cooler than the mass underneath, and as I bring it over the pulp it is still pliable enough from the heat from the center, and as I press it down it will fit the walls, and is less liable to pass through into the surface of the pulp than if that surface was all very soft, so that in passing it through the flame of a lamp, I do not care about the whole of the mass being soft. I think that the surface that comes in contact with the walls of the cavity is pliable, and that is all I want, and I press it into place. My notion is that the more you begin to work it around, first one way and then the other, the more liable you are to loosen the filling. I take the mass large enough, and press it in, so that when it gets in, the diameter of the gutta-percha is less than that of the cavity, so that it strikes the bottom and excludes the air by pressing from the bottom of the cavity up to the walls at the top, getting the holes full, getting cool, and never cooler than the wall. In pressing the instrument down, every time you press down, press towards the wall, and not fill up from the wall.

Dr. Wilson. I use gutta-percha to a great extent just as Dr. Wells does, only that on going to fill a very large cavity with gutta-percha, I do not always use one piece, but if I am going to fill a small cavity, I always use one piece. His idea of pushing your instrument always towards the edge of the cavity, I believe, is correct. I notice in discussing this subject, in different sccieties, that some men claim that you cannot put in gutta-percha filling without moisture getting into the filling. I do not doubt but what that may be true, but I do know that gutta percha can be put in a tooth so that the secretions of the mouth will not get in between the filling and the tooth. I do not say that I always do that, but I always aim to, and if I do not, I think it is my fault, and not the fault of the gutta-

percha. I think the difficulty of working has something to do with the filling. I use the least little bit of chlora percha very often before I warm the filling that I am to fill the cavity with, and I use this gutta-percha very often in children's teeth, instead of using cement. I think it will last longer than almost anything else you can use as a temporary filling for children's teeth. I use it not because it looks better, because I do not think it looks as well as phosphate, but I use it because I think, and in fact I know, that it will last longer in my hands. With chlora-percha, I think, of course, if the pulp was exposed I would hardly want to use that, but I think it enables you to get the actual contact between the walls of the cavity and your gutta-percha.

Some one said that he was bothered by his instrument sticking. Sometimes I use a little soapstone for that. Just the least mite will keep the instrument from sticking to the gutta percha, and will enable you to get along a little better. In root filling I do not use quite as much chlora percha as I used to. I use the kinds that can be bought at the dental depots, or have my assistant make them, and I do not aim to use near as much gutta-percha in the root as I used to; another reason, I think sometimes when we use chlora percha, and then use gutta-percha, you have not got the color; you color your tooth red, and do not get as good a looking tooth after it is filled as if you had used even oxyphosphate. There is a tendency to leave in the tooth next to the gum a little color that chlora percha has produced by showing through the tooth.

Dr. Wells. Do you use colored gutta-percha?

Dr. Wilson. Yes, I use the red; that is what I was talking about.

Dr. Overholser. I would like to ask Dr. Wells what he understands is the cause of this gutta-percha bulging so. Is it a tendency to ball up into a sphere, as if inherent in the gutta-percha, or is it from the earthly compound that enters into it?

Dr. Wells. I could not explain that. I must say that in the observation of fillings that I have inserted, I have not seen much tendency of the gutta-percha to ball; that is; I mean to raise out of the cavity, I have always, or as a general rule, used the old-fashioned Hill's stopping. I have tried a few other preparations, and in many I find a tendency, as Dr. Overholser says, to stick. Just as soon as you get them soft they stick to the instrument, and when you put it in the cavity and take the instrument away the gutta-percha comes away with the instrument. But with Hill's stopping I have never observed much of that tendency to swell out; and even if I had observed it, I could not tell the reason why it should do so. I am sorry I can not answer the Doctor's question in regard to that.

Dr. Oliver. I think that in almost every case you will find the bulging is caused by the gutta-percha being too warm, and it bulges when it cools.

Dr. Hunt. Dr. Chappell suggests that in cooling it contracts.

Dr. Oliver. It depends a good deal on the process of hardening it.

Dr. Hunt. As Dr. Chappell made the suggestion about bulging, I would like to have his opinion as to what he thinks is the cause of it.

Dr. Chappell. There is much of our gutta-percha adulterated. I mean that instead of using the earthy matter they use this preparation in place of the gutta-percha. The bulging is the deterioration of the material of the filling itself, on account of not being pure gutta-percha. I have never had as much trouble with Hill's stopping or pulp cement. I have found a little difficulty in the warming as the cause, but there is one stopping made by Dr. Caulk that is as near being the nicest thing in the world as anything I ever saw. He makes several grades, from very hard to reasonably soft.

Dr. Hunt. It is a lost art.

Dr. Chappell. It is a lost art, and a great many other arts will go with it.

Dr. Oliver. Is it through any fault in manipulating the gutta percha, or that the gutta-percha is so porous that it will absorb so as to alter the filling materially?

Dr. Wells. I believe that there are some agents which will produce the destruction chemically of the gutta-percha. I believe that in some of them that agent is absent. I have taken gutta-percha out of cavities that have been filled more than a year, and found no unusual odor. Of course, if we burn the gutta-percha it will decompose, and you will have a very sensible odor. I think, also, that whisky has a tendency to decompose it. I received that idea from an old scientific gentleman. I filled a tooth for him with gutta-percha. It was on the posterior surface of a molar or bicuspid, I am not sure which, and it was a tooth that I thought would not stand the pressure. It was loose, and yet he wanted to save the tooth, and it appeared to me that that was the proper thing to use. After he had used it awhile he said to me that he wanted me to remove it, fill it, and put in something that did not smell so bad as gutta-percha. He said the whisky seemed to destroy the gutta-percha and soften it, and it smelled bad. I believe he was right. I believe that there is chemical action of the liquor on the gutta-percha. There may be other things besides whisky that will destroy it.

A Member. How did it get up into the root?

Dr. Hunt. It was not the root; it was the surface.

Dr. Wells. Of course, if you use a filling of any kind on a root, you may expect to have pressure on the root, regardless of the filling material. There is a very bad odor from a decomposing gutta-percha filling, and when that is the case I do not know what causes it, unless it is from whisky or some other agent. Of course, there must be some cause. I have known fillings that have been in six or eight, or ten years. One lady said a filling had been in

seven years and it was good but worn some. Now, of course, if the gutta-percha was going to deteriorate, caused by the presence of moisture and heat, they would have been decomposed long ago, so that I could not tell only as I got the idea from this rather scientific gentleman who said that whisky destroyed the gutta-percha and made it smell bad.

Dr. Burt. I would like to ask Dr. Wells how long he has been filling roots that way?

Dr. Wells. I do not know that I can tell exactly. I would think as much as fifteen or twenty years.

Dr. Burt. Did you ever take any teeth out afterward that had been filled with gutta-percha?

Dr. Wells. I do not remember that I ever did.

Dr. Burt. I wanted to know the condition of it; that was all. I do not fill roots that way.

Dr. Morse. We are taught that if we wish to avoid pain we must avoid pressure on the exposed pulp; and to insert gutta-percha even as warm as the pulp or as it possibly would stand it, it would require more or less pressure, I should think, on the pulp, and therefore cause more or less pain. While the material in itself, I should think, would be an excellent thing to act as a non-conductor between the metallic filling and the exposed pulp, or pulp nearly exposed, it seems to me that it would be a very difficult matter to apply the gutta-percha over the pulp without causing pressure, because it has to be put in with a certain amount of pressure, and you have it attached to all the walls and leave no air space over the pulp, and it requires a very delicate manipulation, certainly. While I never practiced it and have not tried it, it would appear very difficult work for me, at least. I have noticed the decomposition of gutta-percha spoken of, but most usually it seems to me there was more or less leakage to the filling in those cases.

Dr. Chappell. Decomposition of filling, if you will

observe, is in teeth that have no occluding tooth or teeth and that are not kept clean; you will find in those cases a tendency to bulging. By means of considerable friction and washing you will find that the filling does not bulge, but there will be gradual attrition there, so as to get it off. As the surface deteriorates it is gradually worn off. I have teeth that have been filled for some of my patients for the last six or eight years with gutta-percha, and I have to fill them every few years for the simple reason that they will not consent to have gold put in them, and I would not consent to put in amalgam or anything else, so they have kept them in that way and they gradually wear out. There is no tendency at all in those teeth to disintegrate. If you use pure gutta-percha and a sufficient amount of foreign inorganic matter so as to make it solid, you will not have that trouble of bulging. But there is a disposition on the part of a great many of our manufacturers to make it with as great profit as possible. I have observed one fact about gutta-percha fillings, and that is that you must keep the surface clean. I think that the whisky case mentioned came from the simple fact that there is a great variety of secretions in the mouth around the teeth and filling, and, of course, it does not absorb to a great extent the secretions of the mouth, but they will disintegrate the rubber unless it is vulcanized with a certain degree of heat. If you had any old rubber hose or anything of that kind where the degree of vulcanization is only to such extent as the whole mass can hold it in form and give it pliability, the rubber will disintegrate very rapidly; but if you have a sufficient amount of heat and vulcanize it to a certain extent, so as to throw it off and leave the inorganic matter there, it will become a much more difficult matter for you to disintegrate the rubber or the gutta-percha. You will find that to be the rule. Rubber, of course, can be made with a higher degree of perfection than the gutta-percha in the arts, and you will find that the same way in filling teeth, that it will discolor unless certain conditions are constantly obtained.

The President. I would like to ask the Doctor if you ever find, under gutta-percha filling that you put in where the pulp is exposed, that the pulp was dead and gone?

Dr. Chappell. Yes, I often find the pulp dead without any decay. Why the pulp dies I do not know; I do not suppose the Angel Gabriel could tell.

The President. I merely asked the question because I supposed that in cases where the pulp is exposed pretty badly it has been killed.

Dr. Chappell. There is many a pulp dead where we fill a cavity when we think the pulp is alive, but there is no sign of a pulp there. It is simply a cavity and the foramen is closed.

Dr. Durr. I would like to ask any of the gentlemen if they ever use shellac and oxide of zinc for root filling or temporary stopping. I have used it a long time myself.

Dr. Wells. No, I have never used it.

Dr. Burt. I have used it somewhat myself. I use shellac rather thick, then mix the oxide of zinc with it and make a thick paste or putty, and you can incorporate carbolic acid with it, and it makes an excellent stopping. In either temporary fillings for children or root fillings you can insert it, and the moisture will not have any effect on it whatever.

Dr Hunt. Does it become pretty hard?

Dr. Durr. Yes, but it is slow in hardening. It takes perhaps a couple of days to harden thoroughly. That is one objection to its use for temporary filling, but you can remove a portion and put cement in, in cases where the filling should be something that hardens very quickly; and also in teeth that are very sensitive you can dissolve it with the acid and insert it with the filling; the tooth has a tendency, of course, to become sensitive.

Dr. Wells. In closing the discussion it seems to me that it has been broadened a great deal, and I hope the

gentlemen will excuse me for seeming to have neglected that branch. I did not propose in my paper to tell when or where you should use gutta-percha for filling, but merely how to introduce it to make it the most useful; to do it according to my notion in the easiest and best way; to put it in a cavity without regard to why it should be there; therefore, I left out all theories in regard to the cleansing of the cavity or the condition of the pulp, and all those pathological conditions. I did not intend to discuss whether it was a better filling than anything else, so that you will understand that I merely intended in my paper to tell how to introduce it. After you have determined to use it, then how to do it. That is one reason why I did not speak of many of these other things that Dr. Chappell and many others have mentioned Those are all proper things to consider, but inasmuch as my paper did not embrace that, I said nothing about it. In regard to some questions that have been asked me about shellac, I would say that while I have not used it I have heard it recommended by others. Dr. Leo, a nephew of Dr. Gardner and J. Oscar Bell, at the time our Association met with the Kentucky Association at Louisville, spoke of using that and recommended it.

Dr. Durr. I would like to ask if the gentleman used shellac the same way, mixed with the oxide of zinc, or shellac itself?

Dr. Wells. I think he used just the pure shellac.

Dr. Durr. I think you will find a difference. This makes a plastic paste that you can force into the smallest root canal, and the shellac will harden rather too quickly for that purpose.

Dr. Hunt. Do you use heat in introducing it?

Dr. Durr. No; no heat whatever; just a plastic paste. You can make it of any consistency you want to, and I find it is an advantage to incorporate a little carbolic acid with it; it seems to make a better filling. I have removed

fillings of that kind. I filled a tooth for a lady who broke off the crown of a lateral and I had occasion to put on another crown. I drilled up as far as I could drill, but I could not find any moisture or any offensive odor whatever.

Dr. Hunt. Do you think this makes a tight joint between them?

Dr. Durr. I think it does; I think it makes a water-tight joint.

Dr. Hunt. The process of hardening is caused by the evaporation of the alcohol, I suppose, is it?

Dr. Durr. Yes. The process of hardening is very slow; that is the principal objection in using it. I filled a deciduous tooth for my little girl that I think was in the cavity two years.

A Member. What was the color of the filling?

Dr. Durr. Something like gutta percha; something of a peach red color.

The President. You can use a white shellac and make it pretty nearly white.

Dr. Durr. I presume you can. I never use it; I always use the other; I have been using it for several years.

Dr. Overholser. I wish to diverge just a little on the subject of root fillings. Remarks have been made regarding the capping of pulps. Two years ago I wrote a paper on the subject, in reference to where the pulp was found exposed or devitalized. I said very little about the capping of pulps, because it seemed to be the experience of the profession that the capping of pulps has been a failure. Now I considered that that was really a process that was almost obsolete in dentistry. That is a rather sweeping assertion, but at the same time I believed it to be the case. Aside from the very few cases of early childhood, I would like to hear the general expression as to when and where

we should cap pulps. Owing to an unfortunate circumstance in the Dental Association two years ago when my paper was presented, the subject was not spoken of at all, but one of the remedies that I suggested seemed to get all the argument and nothing was said about when and where we should cap pulps. I should like to hear that subject discussed. Possibly you would like to know my position on the subject, and that is that I always devitalize the pulp; that is, I do for any one except a very young person, and I never cap a pulp unless I see it and know it is there. As Dr. Chappell said a moment ago, sometimes pulps are capped, or rather canals are capped. We ought not to cap anything until we know it is there, and if the pulp has not ached, then there seems to be all the more reason to find out whether it is there or not. Sometimes we inquire of the patient, "Has the tooth ached?" The patient says "No." Possibly the reason it has not ached is that the pulp has died out gradually, and it would never pain unless it was an abscessed tooth, and that is going on with a rather low degree of inflammation and not giving trouble.

Dr. Chappell. On the subject referred to by Dr. Overholser as to when a tooth has ached, I would like to ask whether it is pulp irritation, eroded enamel, denuding the dentine or removing the enamel slightly so that there is febrile irritation, or whether he has reference to pulpitis or abscess and so on.

Dr. Overholser. I might say pulpitis. Of course, there are a great many people that we can not do anything with, if there is abrasion of the enamel; people who for several years have a sensitive tooth that they can not eat on, and who can not take anything hot or cold into the mouth; and it is much more satisfactory to drill into the tooth and destroy the pulp proper and cap it and give the patient satisfaction, without any sentimentality.

Dr. Chappell. The reason why I ask the question is from the simple fact that there are so many persons that

fail to consider the difference in individuals and the difference in the texture of the tooth. For instance, take a child in the process of development where the tubules of the teeth are large and the fibril are necessarily large. We will expose the pulp, and I will illustrate what I meant by exposure in this way; if this window and these doors were opened we would be exposed to the inclemency of the weather, but if we were to take off all our clothing and go out there we would be denuded and extremely exposed. That is an extravagant comparison, but it is frequently the case that the pulp is entirely in good order but the fibril life is in a state of irritation. We can not say that it is inflamed because it does not possess the elements or structure capable of what we know now as inflammation; but there is a sufficient amount of irritation there to produce pain at the touch or under pressure, and chemical erosion is going on and there is pain; the tooth has ached, when if we cleansed the tooth and dried it and dressed it and used gutta percha, we would have a good tooth and no necessity of extracting the pulp. We must bear in mind that we must draw the line somewhere between health and disease, and we must be very careful whenever we find a tooth that has sensation, to know the degree of cold that will affect it. As to the treatment of tooth pulp, that means the treatment of fibril, the treatment of the undeveloped structure of the tooth. If it were not so, nearly all our cases in filling children's teeth would be failures, because whenever we find that the aggressive element of decay is penetrating the pulp, an effort of nature is made in the opposite direction. Then we have the resistence of the deposit around there and if we can help nature in protecting that, we have done just what a good dentist ought to—help serve nature in its efforts.

But that is not what I ask about in regard to the condition when the tooth has ached. We must not always depend for our diagnosis on what a patient tells us. When any disease or trouble anywhere, we must diagnose

by sensation, and find out whether the pulp is really affected or not, or whether it is the fibril. We must get a healthy tooth and see that it is all right and go on until we come to the diseased part. A great many have been led to believe, from some discussions in the societies, that whenever a tooth has a cavity that has the least bit of sensitiveness, they should destroy the nerve by making an application of arsenic or anything else that is appropriate. Before I do that, I see whether the pulp is alive and use other means to test that tooth as to whether the pulp is dead or alive.

Dr. Morse. I wish a little information on the point of nomenclature in regard to the capping of pulps. We hear about pulp capping and pulp-lining and I want to ask whether they mean that the pulp is exposed or not exposed, or whether there is a thin membrane or small portion of the tooth that covers the pulp. According to my understanding, capping a pulp would be only when it is exposed, and I wish to know whether that is correct or not.

Dr. Overholser. That is the kind of pulp that I had in my mind when I said an exposed pulp.

Dr Chappell. The doctor has reference to what is known as a denuded pulp, where there is lamina of the bone, as the Doctor suggested. That is what you had reference to—where the pulp is exposed—is it?

Dr. Morse. Yes.

Dr. Wells. Since we have got on another subject, I would say that I am astonished to hear that the term "filling over an exposed pulp" is obsolete. I know I have been doing it right along for twenty years or more—nearly thirty years. I think I have been filling over an exposed pulp every month in the year, and a good many of them some months, and a good many have died, while a good many have lived. I found them alive years afterward. I think I have had fifty teeth with the pulp exposed at a small point and a healthy condition. I mean without any

inflammation or ulceration. We must not put any kind of filling over a pulp that is discharging pus, but if the structure is all there, covering the pulp and all the live tissues there except that bony lamina, or a portion of that, and you can get your gutta percha filling or something else if there is anything better (I do not know anything better)—if you can get that applied right down to that without presing the pulp and without diminishing the size of the pulp, because when you press any part you diminish the size—if you can get that down and save one-quarter of those pulps for a year, and perhaps a good many years afterward, I think it is worth the trial even if you do find the tooth aching somewhat and you have to take out the filling and destroy the pulp. I have taken out a good many gutta-percha fillings and destroyed the pulp when there was inflammation, and I have saved them and many are alive and healthy yet.

The first thing that gave me a great impression with regard to the utility of gutta-percha over an exposed pulp was one in my own mouth. The doctor excavated some very large cavities. I did not know that there was any cavity in the tooth until by the appearance of it he detected signs of decay, made an opening, removed the decay, and the pulp was exposed. He put in a gutta-percha filling with Hill's Stopping and that remained until the next session of the Dental College. I returned and he removed that filling and put in a gold filling. That remained a good many years. Finally I lost that and I had it filled with a temporary filling of oxychloride of zinc, I think two or three times, and finally, after I had used it about fifteen years or more, the tooth became troublesome and sore. There was indication that the pulp was dead, and I had to remove the tooth finally, it became so troublesome. I took a file and commenced filing on the side of the root to see where the opening was, and as I filed down I saw evidence that there had been a deposit of substance where that pulp originally was, and I followed it down I think for a quarter

of an inch from where I supposed the exposure commenced, or from the point where it was first exposed. I filed down there about a quarter of an inch before I found the place where the pulp had died. It just kept following the wall and receding until it went down about a quarter of an inch, and then there was a large surface protection a quarter of an inch thick, but why it had died I do not know. I think there might be a good many that would not die even after that long.

Dr. Bell. It seems to me that an exposed nerve, or pulp rather, is in the condition that there is not the least particle of dentine over it, in some one particular spot. It may be even as fine as the point of a needle, but when there is what we term "an exposed pulp," it seems to me that the dentine is entirely gone. When you have a very slight film of dentine over the pulp you would require there, it seems to me, something similar to a capping. It would have to be of a non-conducting substance, just the same as a capping. That would be termed an "intermediate." A capping would not be termed an "intermediate," because it would be directly upon the pulp, providing it was a substance that might press down in that way. There are various kinds of capping. You might use a metal capping and have that metal capping, first with some non-conducting substance over it, of a concave surface below and a convex surface above, and in that way you would protect the whole body. Now, I do not believe that all pulps ought to be capped that are exposed, nor I do not believe that all ought to be saved. I think that the general condition of the patient should be considered above everything. If the patient is enemic, particularly a woman having her family duties to look after, if the pulp of one of her teeth is entirely exposed and has given her some trouble, I think that under such circumstances it would be wise to devitalize. If the patient is young, strong, healthy, and having good recuperative power, I believe that even though the pulp has given some trouble it would be per-

fectly safe to cap it. But I govern myself in this way: I never fill directly after capping; I would cap the pulp and let the patient go for at least two weeks before I would proceed any further.

Dr. Hunt. In hearing the discussions here I was reminded of the period when I first learned of the capping of pulps. It came to me that we used to use goose quills for capping pulps, and it is a good non-conductor, splitting the quill and laying it in over the nerve as a protection. They did not work very well. Of course, we did not get very close contact with the goose quills, or if we did we had trouble. Then soon after that soapstone was used as a capping, with better results. Then it was at one time quite a practice or custom to fill gold in there, leaving a hollow in the gold, so as not to put any pressure on the center of the tooth that might produce pain from the pressure in contact with the nerve substance. All these discussions carry me back to the days when I first heard of capping pulps. As we have been digressing from the paper, I will state a little occurrence that took place at Louisville a good many years ago, along in the days of the first operations of filling pulp cavities. There was an elderly gentleman that had been in the practice of dentistry for a number of years, whose field of operations extended from New Orleans to Louisville, the gentleman practicing and stopping at Vicksburg, Memphis and Natchez. He was a Southern gentlemen, and really a very high type of a gentlemen. I was a very young dentist and called upon him, and in the course of the conversation I mentioned the fact that the roots of teeth were successfully filled. The old gentleman braced up and said yes, he knew that there were some young dentists that thought they had discovered something but they did not amount to anything. Well, having said that, I was considerably nettled and could not resist the temptation to fire back at him that there were also a great many fogies in the practice of dentistry that would not accept of an advance when it was presented to

them. He got up and took me by the hand and said, "Come in the back room here, young man," and he opened a bottle of champagne.

Dr. Johnston. There is one thing that has not been referred to, and it occurs to me that there is something in it. I have had very little success in capping pulps after there has been an exposure and decay has reached such a point that it might become necessary to make a covering that would leave the pulp room. I do not think we will succeed from the fact that, if the pulp needs any room there, we have a ragged, uneven surface where the break is, that will continually irritate that pulp, and I do not think we can succeed. There are some few persons that will bear almost anything. We can do some things with some people that we can not do with others. Some people will tell you that the tooth never ached, but that it hurts a little. I believe that the pulp is continually irritated by the exposure of the broken, irregular surface, and it is unnecessary or impossible to save the tooth by capping. In all such cases I would devitalize the pulp.

Dr. Hunt. Do you think that in all pulps exposed to the bottom of the cavity there must necessarily be the ragged edge that you speak of? Do you not think that there is a protrusion of the pulp that would cause irritation?

Dr. Johnston. I think there is if the pulp is not possibly devitalized already.

Dr. Hunt. But in cases where a portion should be accidentally exposed and the pulp had not ached, would there then be a protrusion through or would you attempt to cap the pulp there?

Dr. Johnson. I think there would be sufficient to cause irritation there; it comes to the ragged edge.

Dr. Hunt. I think my testimony is a little like that of Dr. Wells; that there are a good many cases, in my treatment—and yet I feel as if there were so many cases that

appear to be successes—that I should keep on capping nerves in what I consider favorable cases, and I would consider it a favorable case if we had accidentally exposed a nerve in such cases. I remember distinctly a circumstance and I doubted the man's statement, and yet he was a very intelligent gentleman. He was an old man and showed me a tooth with a very large amalgam filling in it. He had had a filling that he lost in crossing the Hudson River. He was a bridge-builder and fell into the hands of a man that thought it ought to be filled. It was a permanent molar and instead of filling it with amalgam he filled the tooth with gutta-percha, and he said he had had it in his mouth ever since, and when I looked at it, it was a healthy tooth and responded to the touch. I could hardly believe the statement, but he was an intelligent man and seemed to know all about it and remarked how he was saved from having an amalgam filling put in.

Dr. Chappell. We must bear in mind that whenever we consider tooth pulp exposed, the fibril may be irritated to that extent that irritation may affect a section of the tubules until there will be an exudation. We may have irritation sufficient extending down to the tubules and membrane and there will be effusion, and whenever that effusion takes place, that is to a certain extent an abscess. Whenever you put a capping on that, you have trouble with it sooner or later, just as certain as when you have an ulcerated membrane discharging through the canal of the tooth. Whenever you stop that discharge, septasenia sets in and trouble generally. Now whenever you have any indication there that there is effusion, that there is pulpitus, or anything of that kind leading to the effusion and discharge through those tubules, you must be very careful not to put any filling over there or to dam up these secretions that are being thrown off. Now there is the secret to a great many of those questions. There is another thing; there are a great many of those teeth that have begun to die at the same time the tooth had begun to decay. I mean

the pulp has begun to die and recede. Sometimes the pulp begins after the period of ossification. That is a natural physiological effect. Then in the period of child-life, calcification sets in. Now, I would say to the students, all to remember, never to dam an abscess, or the abscess will "damn" you. In regard to antiseptic treatment of the wounds, you will use for anti septic dressing, bichloride dressing and bichloride preparations of cotton. Take a ball of cotton, put in a five hundred solution. This is as much bichloride as we can absorb in the treatment of all such cases, to fairly destroy the germs.

A Member. Supposing you are shot?

Dr. Chappell. Well, then, take five hundred and twenty-five per cent. You must provide all the time for taking up those exudations and stopping that condition. Sometimes we fail in spite of our work, and if we do allow it to pass off in that exudation, it will be taken back with irritation, and you know all the phenomena leading to inflammation, such as suppuration, ulceration, and so on. There may be a microscopical exudation there that we do not think of unless we are careful to take sufficient forethought to provide against it. If we fill a tooth of that kind, and place a dressing, reasonably or unreasonably large enough, after you have cleaned it out as well as you can, and washed it with warm water cooled to the temperature of the tooth, say ninety or ninety-eight, or whatever it may be, do not go beyond that unless you want to increase the exudation, if you run above the temperature of the tooth. Of course the temperature of the tooth is not equal to that of the soft parts, but then you must destroy the germs there, and then treat it as you would any other wound. Then you can put in a permanent capping and filling, and not until then, with any degree of certainty. But it differs now and then. I know that there are a great many cases where we destroy the nerve just as soon as we find any complaint, or pain, or anything of the kind. That is not necessary any more than it is to cut off a little piece

of the nose because your nose bleeds. How many of you have seen pulp of teeth that has ruptured, and you have treated it, and after a few weeks you find that there is pulp remaining there, and there is a membrane grown there? The pulp has come out through an orifice, and strangulation takes place, and sometimes you make an application of pressure to bring it back to its natural condition again. You find the pulp, you go back to its place, and you can then cap it, and it will last for years with good success. Sometimes you can do that. Whenever you can not get it back, it will begin to inflame, and an abscess will form, and you will have your patient call again before taking it out. You must be guided by the conditions. Do not think we must always attempt the treatment of pulps, and capping of pulps, and saving teeth. We have patients who come into our offices and say: "I want that tooth saved; I want that pulp saved; I do not want any more abscesses." We have to do all that we can to save that pulp, and there is where our wits are tried, to save that pulp. It is an easy matter to save the crown, if they will keep the teeth clean. The question is to save the pulp. That is what we have to do, and if we do not do it we are to blame.

Dr. Morse. I would like to ask Dr. Chappell what his mode of capping the pulp is?

Dr. Chappell. The mode of treating the pulp?

Dr. Morse. Yes; capping the pulp when it is ready to put in?

Dr. Chappell. You come to the question that they have all asked. It is owing to the condition, as I said before. Molecules of the sulphuric acid and arsenic are migratory, and we are liable to have difficulty, but the least irritating substance you can get is gutta-percha. As I said awhile ago, burnish the walls of the cavity until you get to the center. Now, if you will use soapstone, as the Doctor said awhile ago, you can get that done, sometimes in certain cases using fine olive oil, and go over it, leaving

a smooth surface. You can then build over that as a cap. I never want any pressure on it. I want that to be as soft as possible. In filling with gold, I do not want to fill the tooth with gold just then; I want to let the tooth rest. You can tell about the work whenever you see it; you know how it is done. I make it a rule whenever I turn out a patient to see a brother dentist and allow him to criticise; I want to do the very best work I can in that particular. I sometimes have patients in a preparatory state, or state of progress, that go into the hands of some other dentist who does not know how to do it; but as a general thing, your patients come back, and whenever you establish confidence in them, they will come back to you, and you will save the tooth. Do not be in too big a hurry about capping a tooth. After you place in the cotton and take out the exudation, whenever you are satisfied there is no effusion, then you can begin to put in the gutta-percha, if there has been great irritability there, and when you go to fill with gold it is only necessary for a surface. There is a good deal of difficulty in one respect, and this is in proportion as the tooth needs saving, gold is the meanest thing to try to save the tooth with, because you can not save it by putting a little cap over the top when there is effusion there, and there is a great deal of pathological disturbance. You can not save with gold, and you can not save with amalgam, and that is the reason why we have so many failures, because we are in too big a hurry. If a physician was to visit some of the brethren here, and give medicine with a view that that dose of medicine was going to make him well, so that he could come to the office the next day, you would be disappointed if he did not do it. We must not expect to treat a tooth and get it well in a minute; you can not do it, it can not be done.—*Indiana State Dental Association.*

ARTICLE. II.

STOMATITIS.—DIARRHŒA IN INFANTS.

BY H. A. HARE, M. D.,

Clinical Professor of diseases of children, University of Pennsylvania, etc, etc.

STOMATITIS.

Gentlemen: The first case I show you to-day illustrates a disease which is frequently seen in children, but generally in those not so far advanced in age as is this boy. It is a case of ulcerative stomatitis, so called. Stomatitis is a very important disease, affecting, as it does, at one period of life, almost every child, producing at times very serious systemic disturbances, and occasioning considerable anxiety on the part of the parents. It may also at times produce reflex nervous trouble, such as a slight spasm. This affection has been divided into different classes by various authors, all of whom appear to confound more or less the various forms.

CATARRHAL STOMATITIS.

According to the best authorities, the simplest form of stomatitis is the catarrhal form. This amounts to nothing more than a simple hyperemia of the entire mucous membrane of the mouth, which may extend to that of the pharynx, and perhaps down to œsophagus, or at times even through the entire alimentary canal. It corresponds to an acute cold in the head, so far as the pathological changes in the mucous membrane are concerned. Under these circumstances we are generally called to see the child because it has stopped nursing, or, if it be older, because it complains of a sensation of heat in the mouth, attended with a great deal of slobbering, and associated with crying and a constant moving of the hand to the

mouth. Occasionally there is a slight febrile movement. Upon placing the finger in the mouth it is found to be hot to the touch and inflamed. This is probably due to the fact that there is an increased hyperemia, and consequently an increased local temperature. This is the simplest and mildest form of the disease. A little care devoted to the cleansing of the nipple, or regulating the diet, together with the use of some febrifuge mixture, such as the citrate of potassium and water, will relieve the child in a few hours, unless the attack be so severe as to bring on the aphthous form, or the mild ulcerative form.

APHTHOUS STOMATITIS.

Aphthous stomatitis is really in one sense an ulcerative stomatitis, and yet it is not called so in the text-books. It is a stomatitis in which the catarrhal process has been so severe, particularly about the mucous follicles, that it has resulted in the death in small spots of the epithelium of the tongue and buccal mucous membrane. Small superficial ulcerations are formed, without any induration around their bases, and are not excavated—a form, practically, of a very mild ulcerative stomatitis. Aphthous stomatitis has been confounded by many writers with thrush. When a child comes to you with white, raised spots upon the tongue, that is thrush; if, instead, there are simple ulcerations upon the tongue, that is aphtha. In aphthous stomatitis, or "baby's sore mouth," as it is frequently called, the child loses its appetite, has a high fever, sooner or later develops diarrhœa or obstinate constipation, and may present severe nervous symptoms, twitchings of the muscles, and turning in of the thumbs. This condition requires careful treatment. It should be watched closely. A mixture may be prescribed containing:

R Potass. chlorat. - - ʒ ss-i.
Tinct. myrrhæ - - - gtt. v-x.
Elixir. calisayæ - - f ʒ iii.

M. S. One teaspoonful every three or four hours.

As a rule children do not object to this mixture, since it is agreeable to the taste. Why do I give this? Because the chlorate of potassium is eliminated chiefly by the salivary glands, thereby bathing the mucous membrane with medicated saliva, and it is practically impossible to make a local application to the sore spots in young children. As a rule, marked relief speedily follows the use of such a prescription. One contra-indication only exists, and that is any acute renal inflammation, which, however, is a rare condition in childhood, unless it follows an acute disease. In such cases we must resort to other treatment, or use the chlorate in very small doses.

ULCERATIVE STOMATITIS.

We now come to what is known as the true ulcerative stomatitis; and this is a disease which in severity greatly surpasses aphthous stomatitis. It is accompanied by the formation of pocketed ulcerations over the mucous membrane of the mouth, depressed, serpiginous, with crater-like edges and yellow bases, surrounded by induration, and often confluent, spreading over the lips and even down upon the chin in bad cases. There is a constant dribbling of saliva in all forms, wetting the skin of the chest. This is frequently followed by an eruption of eczema over the chest and abdomen. The nasal mucous membrane becomes involved in the process, and the nostrils are stopped up, resulting in breathing through the mouth. This causes the tongue to become as dry and scaly as it does in typhoid fever. Here the local treatment is identical with that in the other varieties. If the child is old enough, the ulcerations should be touched up with the stick of silver nitrate or a strong solution of the same salt. The stronger solutions hurt less than do the weak, and a solution containing from twenty to thirty grains to the ounce is the best for this purpose. It should be applied with a camel's hair brush, care being taken that the brush is not dripping wet. All that is necessary is to moisten the surface of the ulcers. At times

a little cocaine may be used, but generally the burning of the cocaine is worse than that of the silver, and we thus use two medications instead of one. Fewer mixtures of various kinds are wanted. Particular attention should be paid to the bowels and kidneys. The urine is always found to be concentrated, and it is not only well to use the chlorate of potassium solution already named, but it is also wise to order Vichy or some other mineral water, which will act upon the liver and at the same time wash out of the kidneys the potassium products and lower the specific gravity of the urine.

NOMA—CANCRUM ORIS.

We now advance to another form of ulceration of the mouth, known as cancrum oris or noma, which is practically not a stomatitis. We might say that this is an invariably fatal condition. Perforating ulcers appear upon the mucous membrane, going on to gangrene, causing sloughing away of the cheeks, so that the inferior maxilla is exposed. It is accompanied by great loss of flesh, wasting, high fever, cachexia and rapid death. It is a very rare condition in this country, and is probably due to some micro-organism not yet identified. We may use a supporting treatment and apply silver nitrate and other caustics locally; but death usually follows.

This boy has the ordinary mild stomatitis, a little too severe for aphtha, and too mild for the ulcerative form. In some cases of the aphthous and milder ulcerative varieties, and always in the severe forms, the systemic depression that is produced is simply appalling. Within twenty-four hours the child will sink into a complete collapse. Many English writers consequently believe that alcohol should always be used in these cases; and this is a matter it will be well to bear in mind.

You will find among nurses, and particularly monthly nurses, that they always assert that this disease is bound to "go through" the child. Practically this is so. I hardly

ever see a case of stomatitis which is not followed by a catarrh of the bowels and stomach, and the patient is usually ill at least ten days. In such cases, as soon as the diarrhœa becomes excessive, some astringent mixture may be given. But do not check such a diarrhœa too rapidly or serious consequences may follow, and even convulsions in young infants. Paregoric or aromatic sulphuric acid are best for this purpose, their use being stopped as soon as the stools are reduced to two or three in the day.

THRUSH.

I have passed over the condition known as thrush, which is often incorrectly called "baby's sore mouth." Thrush is an entirely different disease, due to the presence in the mouth of saccharomyces albicans. It is due to a fungus and differs from aphthous stomatitis in the fact that it grows from the surface like tufts of mould. Its size varies from that of a pin's head to that of a small finger nail. Thrush is found upon the tip and edges of the tongue as a rule. Practically it presents the same symptoms as does stomatitis: a hot mouth, dribbling, inability to take food on account of the severe pain, although the child is intensely hungry. This is one reason why collapse is so frequent in stomatitis. If the child is old enough to take a mouth-wash, give it a mild carbolized solution, say a one per cent. solution of the crystallized carbolic acid, washing the mouth every two or three hours. The chlorate of potassium is not as useful here as in stomatitis. The carbolic acid is more of an antiseptic and hence is more serviceable. Thrush rarely extends down through the alimentary canal. Some clinical authorities say they have found the fungus in the stomach and even in the small intestines; but this is very rare.

The boy I showed you with the ulcerations around the edge of each tooth has a condition somewhat different from the ordinary stomatitis, in the fact that the ulceration has extended to the gums. It is comparatively rare for

this to occur. I do not know what he received from the dispensary. He came in on Saturday for the first time, and is better since using his mouth-wash. An excellent remedy to use as a wash is the sulpho-carbolate of sodium, five to ten grains to the ounce. This is perfectly innocuous, thus having an advantage over carbolic acid.

One word as to the diet in these cases. Parents always want to know about the diet. This is a very important matter. We cannot cure our patients unless it is attended to. Do not give anything which contains sugar. Cut down the sweetening of the bottle, or use instead a small amount of saccharine. For an older child, order broths, thin, non-greasy soups, and largely a milk diet, washing out the mouth with an antiseptic wash after each meal.

SEROUS DIARRHŒA.

The baby I now show you is three months old, and has had a watery diarrhœa for the past two weeks attended with but little pain, the child crying only occasionally. This is generally the case with a watery diarrhœa. In mucous diarrhœa we nearly always have tenesmus and pain. The child has been fed upon condensed milk, one part to sixteen of water ever since its birth until last Saturday, when it was ordered cow's milk. Undoubtedly this attack the child is suffering from is due to the use of improper food. It was getting condensed milk instead of human or cow's milk. This is one class of cases in which we are apt to meet with thrush.

MUCOUS DIARRHŒA.

The first case you see of mucous diarrhœa in children will puzzle you. It must be controlled; but how can this be done. The first thing is to remove the cause, and then to cure the condition produced by the cause. The mother now tells me that the baby has some green in its stools. This does not generally occur in serous diarrhœa. The presence of green usually indicates a mucous and not a serous diarrhœa. These green spinach stools of young children are always due to fermentation, and we rarely have

fermentation when we have a serous diarrhœa. A small indigestible particle of food lying in the intestinal canal produces an irritation of the mucous membrane and consequent depression of vitality. A gradually spreading catarrh is produced with a mucous secretion, thick and tenacious, which coats the particles of food. These are then rolled along in the canal until finally the child has in its alimentary canal a decomposing piece of milk or meat covered with mucus which cannot be digested. Active inflammation is set up, and fermentation follows, accompanied with the growth of a fungus. These passages are nearly always acid, instead of being alkaline. Should you give the child an astringent mixture now, you will do it harm. Nature is trying to relieve the child by washing the irritating substance out. Something must be given to clear out the alimentary canal. The best thing is a dose of castor oil, a soothing purge taking five hours to act and facilitating the discharge of the immense amount of mucous thrown out in the alimentary canal. Then administer the astringent mixture. If the child has a puffy distended belly, indicating a chronic condition, follow the purge with tonics and alkalies. A mixture of bicarbonate of sodium and gentian is the best remedy for such cases. This primary purgative treatment will occasionally be objected to by the parents, and then it must be explained. If we are compelled to give an astringent, one of the best for a young baby is chalk mixture. This, however, is hard to swallow, and it may be better to give one half or one drop of aromatic sulphuric acid to a child of six months or one year, combined with syrup of ginger, elixir curacoa, or other adjuvant, to render it palatable. A mixture of bicarbonate of soda, forty-eight grains to a drachm, in six ounces of compound infusion of gentian is an excellent preparation, given in dessert-spoonful doses. If the compound tincture of gentian is used, the dose must be less. The only objection to this is its bitter taste; but this may be overcome by administering a peppermint cream drop

before and after giving the dose. The condition of acidity of the alimentary canal is overcome by the alkali, while the compound tincture of gentian is a tonic, overcoming the depression which results from the primary irritation and inflammation.—*Med. and Surg. Reporter.*

ARTICLE III.

A NOTE CONCERNING THE ACTION OF CHLOROFORM.

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The interesting paper from the pen of Mr. Gaddes, which appeared in your issue of September 1st, cannot, I think be permitted to pass without comment. It is hardly necessary to point out that while every one feels a debt of gratitude has been incurred through the public spirit of Surgeon-Major Laurie, at whose suggestion his Highness the Nizam of Hyderabad entered upon the enlightened course of subsidising a Commission of Scientists to investigate a physiological problem of the first importance to the suffering human race, yet a large number of persons more or less skilled alike in the science and practice of Anæsthetics are unable to accept as proven the conclusions arrived at by the Commission. Not a little perplexity and misunderstanding will be spared if the history of the subject is more clearly known, and if it be made evident what really was the state of knowledge antecedent to the formation of the first Commission. Again, careful distinction should be made between the physiological work of the Commission, of its kind most excellent, and the theories built up from these experiments. The legend of the Silver

Shield bears with striking force upon the matter in hand, for while upon the one hand the Commission may regard the proving of experiments as establishing facts of one kind, viewed from the rigidly impartial view of physiological criticism, these same experiments may lend themselves in other minds to a very different class of facts.

Simpson, disliking the clinging odor of ether in confinements, determined, at the suggestion of Mr. Waldie, of Liverpool, to try the effect of the so-called "Chloric ether," which he did. In company with Drs. Keith and Duncan, Sir James, then Dr. Simpson, inhaled chloroform, and, profiting by the snoring of one colleague and the involuntary struggle of the other, he decided that chloroform was worthy of extended trial. It was introduced to the profession by him in his historic pamphlet, "Notice of a New Anæsthetic Agent as a Substitute for Sulphuric Ether in Surgery and Midwifery," November, 1847. However, more or less experiment was being made with chloroform in different parts of the world at this time. Flourens, in the March of the same year, had employed "chloric ether" as an anæsthetic for the lower animals, but came to the conclusion that it was too dangerous for general use.

Glover,* as early as 184?, employed chloroform, and found that absolute paralysis of the heart muscle in mammals followed its injection into the jugular vein. Sibson,† again clearly pointed out that in human beings death from chloroform occurred through heart failure. He wrote: "The heart, influenced by the poison (chloroform), ceased to contract, not from cessation of respiration, for the heart in asphyxia will beat from one to three minutes after respiration has ceased, but from immediate death of the heart." And later on the same author says: "We are obliged then, to conclude from the experience of these cases that in man the death is usually instantaneous, and

* Edinburgh Medical and Surgical Journal, Vol. 58.

† London Medical Gazette, Vol. xiii., 1848.

due, as every instantaneous death is, to paralysis of the heart. In animals [? the lower animals] the death is usually due to paralysis of the muscles of respiration," and that is of course the result of paralysis of the respiratory centres in the medulla. But the most thorough investigation of the action of chloroform in its early days is due to Dr. Snow, whose work was so accurate, so careful and thorough, that one finds most modern experimenters merely travelling in his footsteps, amplifying possibly, but not superseding, a physiological investigation worthy of the highest encomium. In 1895, a Commission was appointed in Paris, and it tendered its report to the Society of Emulation, and came to the conclusion (an important one when it be borne in mind that France was then under the influence of Flourens' adverse criticism) that chloroform, when administered to the lower animals, kills them by stopping respiration, and that the heart beats on after respiration has ceased. About this time Mr. Thomas Wakley performed similar experiments in this country and came to a like conclusion. Thus we see that all these investigations admit that among the lower animals the most usual mode in which death results is through failure of respiration, and that the heart stops subsequently to this. Snow, commencing his research at this stage of our knowledge, showed that what appeared to be a contradiction was in fact a perfectly reconcilable law. Chloroform kills, contends this observer, when its vapour strength in the respired air reaches a certain strength; given to men or the lower animals, if this point is not reached the vital processes remain unimpaired. At the present day this statement requires modification, for there seems to be strong evidence to show that prolonged chloroformization (that is, prolonged contact of chloroform with the tissues) may lead to fatty degeneration, and even bring about post-anæsthetic death from that cause.* But even here Snow

* Thiem & Fischer, "Ueber todliche Nachwirkung des Chloroforms, 1889.

seems to have been before us, for he says †: "If animals [? the lower animals] are kept for a very long time under the deep influence of chloroform, they become ultimately exhausted, the circulation and respiration are gradually weakened, and cease nearly together." The experimenters who came to the conclusion that chloroform could not kill directly through the heart had guarded against the use of higher strengths of vapour than formed Snow's safe percentage, and hence their conclusions were erroneous and amounted in fact only to this: When giving chloroform in such a way as to ensure a strength of less than 5 per cent. animals do not die from primary heart failure. And this is very much what we shall presently see is the contention of the Chloroform Commission of Hyderabad, nor will experts gainsay it, although they demur, and I think justly, when the Commissioners venture to generalize and say: Therefore chloroform never kills primarily through the heart muscle. Snow further showed that high percentages (8 or 10) will even in the lower animals produce primary syncope and death. He makes the following pertinent remark anent deaths of dogs, &c., occurring during experiments: "I have, indeed, been informed of several instances in which animals died in a sudden, and what was thought unaccountable, manner, whilst chloroform was given to prevent pain and struggles which would be occasioned by physiological experiments. In these cases there is no doubt the heart was paralysed, but the experimenters were often too intent on other matters to observe the circumstance." It is curious that the Hyderabad Commissioners state that while their animals never died from primary heart failure, yet deaths did occur from some unexplained cause. "The fatal result was brought about either by neglecting to watch the condition of the respiration during or after the administration of chloroform, ... or from a reckless administration of chloroform, in the endeavor to check or prevent struggles. * These words would seem to lend themselves to two interpretations, firstly, that the "reck-

† On Anæsthetics, p. 109.

* "Lancet," p. 158, vol. i., 1890, "Accidental Death."

less administration," leads to the use of a high percentage of vapor, which determined primary heart failure; secondly, that the animals died in some cases, from reflex syncope, the result of shock, evinced by their struggles, a contention which would seem to discountenance the view of the Commission, that animals partly anæsthetized feel no shock, and so are not liable to reflex syncope. It is not proposed to go to any great length into the subject, so I must refrain from any attempt at exhaustive quotation from Snow's pregnant remarks, but will sum them in the following quotation.† Speaking of the mode of death in a large number of cases, the particulars of which he gives, he says: "In all the cases in which the symptoms which occurred at the time of death are reported there is every reason to conclude, as shown above, that death took place by cardiac syncope or arrest of the action of the heart. In forty of these cases the symptoms of danger appeared to arise entirely from cardiac syncope, and were not complicated by the overaction of the chloroform on the brain. It was only in four cases that the breathing appeared to be embarassed and arrested by the effect of chloroform on the brain and medulla oblongata, at the time when the action of the heart was arrested by it; and only in one of these cases that the breathing was distinctly arrested by the effect of the chloroform, a few seconds before that agent also arrested the action of the heart. * * * Chloroform has the effect of suddenly arresting the action of the heart when it is mixed with the respired air to the extent of 8 or 10 per cent. or upwards; and we must therefore conclude that in the fatal cases of its inhalation, the air the patients were breathing just before the accidents occurred contained this amount of vapour." Snow's teaching, then, amounted to this—chloroform kills through cardiac syncope, induced by a too concentrated vapour of chloroform, or by an excessive accumulation of chloroform in the blood, giving rise to paralysis of the vital centres in the Medulla Oblongato, and causing cessation of respiration first, and heart failure second, and this may occur even when small doses of chloroform are given when care is

† Ibid, p. 217.

not taken to ensure due elimination of the poison. It is obvious that the first cause of death may come into action at any point of time during the administration of chloroform while the second cause would operate only in the later stages of the anæsthetisation. In 1864 a Committee was appointed by the Royal Medico Chirurgical Society of London to investigate the Physiological action of chloroform, and a number of eminent surgeons and physicians took part in the work, being assisted by the skill and special knowledge of Mr. Clover.* Its conclusions are thus summarized: "Chloroform at first increases the force of the heart's action, this effect is slight and transient." "When complete anæsthesia is produced by chloroform, the heart in all cases acts with less than its natural force. . . . The strongest doses of chloroform vapour when admitted freely into the lungs, destroy animal life by arresting the action of the heart." "By moderate doses of chloroform the heart's action is much weakened for some time before death ensues, respiration generally, but not invariably, ceases before the action of the heart, and death is due both to the failure of the heart's action and to that of the respiratory function."

Yet another Commission undertook the investigation of the action of anæsthetics in 1880, this time appointed by the British Medical Association.† Mainly experimental in its operations, this Commission accumulated a number of interesting and highly important facts. The experiments were performed by skilled physiologists working in their laboratories with every appliance at hand, so that we may fairly consider the conclusions at which they arrived as worthy of the most careful consideration, if not of credence. The report says: "Chloroform may cause death in dogs, either by primarily paralysing the heart or the respiration." "In most cases, respiration stops before the heart's action." Further, there is the following important statement: "Without going into detail, we may say that it soon became apparent to us that chloro-

* See "Transac. Roy. Med. Chir. Soc." for that year.

† See the "Brit. Med. Journal," Dec. 15th, 1880, and June 14th, 1890.

form, administered to dogs and rabbits, has a disastrous effect upon the respiratory centres; it is easy to kill one of these animals by pushing the chloroform until respiration is paralysed. In observing the rate of the heart during these experiments, it could often be determined by auscultation, that its contractions were maintained after respiration had ceased. It was apparent, however, that even when failure of respiration was more directly the cause of death, the heart was, to some extent, simultaneously affected; and there were even cases in which the heart appeared to fail at least as soon, if not before, the breathing." Again, the report runs: "The chief dangers" [of chloroform] "are (i) sudden stoppage of the heart; (ii) reduction of the blood pressure; (iii) alteration of the pulse-respiration ratio and sudden cessation of the respiration. "We showed (see Report, 1880) that chloroform vapor has a paralysing effect upon the muscular tissue of the heart, and, indeed, upon all kinds of protoplasm, when directly applied."

While engaged upon the investigation of the action of chloroform, ether, alcohol, ethidene dichloride, bromide of ethyl, and methylene, upon protoplasm, and especially upon that forming the heart muscle of frogs, I perfused the detached heart with both normal saline and blood solution, in which were varying doses of chloroform, and watched the result. The fluid, of course, circulated freely through the heart, and that organ would beat uniformly for hours unless the chloroform, or what not, was introduced into the circulating medium. When, however, chloroform, even in minute doses, was poured into it, and so reached directly the heart muscle, its beat became less in force and soon ceased. If, however, fresh circulating fluid were then perfused so that the chloroform were washed away, no recovery took place, the heart muscle was permanently damaged. This was a marked contrast to the effect of ether.

The Glasgow Committee further examined the heart in situ by opening the thorax and maintaining artificial respiration, and found "where chloroform was given, there is a most serious effect upon the heart; the right ventricle almost immediately becomes distended, the heart presently stops, with the right ventricle engorged with blood." "Ether may be

given for an indefinite period, without interference with the heart." Upon the important subject of blood pressure under chloroform, the Report says that "besides the general fall of blood pressure, (which, be it remarked, betokens an incipient vascular failure,) at certain stages of chlorof rm narcosis, there may be sudden falls in blood pressure, due to interference with the heart's action, and no one can deny that this is a serious state of matters."

The next chapter of our history brings us to the establishment of the first Hyderabad Chloroform Commission. The report of this was not fully published in the English professional journals, and hence some reluctance was expressed as to the acceptance of conclusions based upon premises only imperfectly made known. So to meet this objection the Second Hyderabad Chloroform Commission was, through the generosity of His Highness the Nizam of Hyderabad, established, and Dr. Lauder Brunton was asked by the editors of the *Lancet* to join it as a representative. This Commission repeated the work done by its predecessor, although upon wider lines. Still its report may be taken as representing the opinions and facts on which these opinions were based, alike of the First and Second Hyderabad Chloroform Commissions.

The main issues to which these Commissions addressed themselves may be stated as follows:—1. How does chloroform kill? (*a*) through respiration failure alone, as taught by Syme and Simpson; or (*b*) through primary heart failure; or (*c*) through either of these, according to circumstances. Further attention was directed to subsidiary matters, among which we may note (*a*) the effect of chloroform upon blood pressure; (*b*) effects of shock under chloroform.

The experiments were carefully made upon dogs, goats, monkeys, and other animals, and as a result conclusions were arrived at that these animals died in every case in which they were carefully watched, through failure of respiration, and in no instance was primary heart failure met with. Had the Commissioners stopped here, we should probably have had no occasion to gainsay their "finding," but they did not. They formulated a series of conclusions, applying their facts derived

mainly from pariah dogs, not to pariah dogs in the aggregate, but to human beings, and those, by the way, living under the most diverse conditions. Much mischief has already been done by the indiscriminate publication in the professional and lay press, both here and in America, of these "conclusions," without any attempt either to reproduce or examine critically the experiments from which they are supposed to follow. There is a wide gap in the animal scale between pariah dogs and Europeans, and no one conversant with the behavior of the lower animals under anæsthetics and that of human beings under the same circumstances, would be content to admit that generalizations from one to the other were worthy of more than the most guarded admission.

Again, the conclusions of the Hyderabad Commission are at variance with similar observations made upon the lower animals in this country, and as the experimenters were at least of equal manipulative skill, and possessed of competent physiological knowledge, we are bound to say that the conclusions are of only limited application, and do not apply to less tropical countries. As I have showed above, by quotation from the report, the Commission lost several animals from "accidental deaths," which deaths we may believe were due to heart failure from overdosage.

Again, the evidence brought forward by the Hyderabad Commission concerning chloroform death amounts to this: (i) when death occurred and the phenomena accompanying it were observed, it was due to paralysis of respiration, and heart failure did not take place until some seconds after cessation of respiration; (ii) no death among the animals experimented upon was observed to occur from primary heart failure The animals numbered in all about 500, but many were experimented upon in other ways. Now this is quite in keeping with what other experimentalists have found. Deaths under chloroform are stated to occur about once in every 2,500 or 3,000 persons subjected to the anæsthetic, so that it would not have been any matter of surprise if the Commission had not lost a single animal of their 500 or so, but they did lose them. Again, of the deaths (1 in 3,000 say) a proportion are due to carelessness or ignorant anæsthetising, and some to shock

(this the Commission would deny, but, as I shall show later on, their contention falls short of proof), while some are undoubtedly cases in which respiration stops before or simultaneously with the cardiac syncope, so that when all these deductions are made, we shall find the number of instances of primary cardiac syncope per thousand represented by a small fraction. Such being the case—and these facts would certainly be vouched for by anæsthetists of wide experience, such as Snow, Clover, Richardson—we are compelled to regard even positive evidence arrived at by the examination of so few as 500 animals as of slight value, as against evidence furnished by hundreds of thousands of administrations to human beings; and when we come to negative evidence—that the Commission did not meet with a single case among the lower animals of primary cardiac syncope—we are still more strongly impelled to regard the conclusions based upon such evidence as unreliable and wholly unsatisfactory.

There is, however, yet another strong contention to be urged against the results at which the Hyderabad Commissioners arrived, and that is that other observers working in the same lines have arrived at results quite at variance with those obtained in India. It would be out of place here to attempt to explain such discrepancies, by variation in the stamina of the animals used,* the protection of an environing uniformly high temperature, &c., as it is rather the object of the present communication to compare results than to harmonize or explain their divarications.

It has been pointed out above that the Glasgow Commission undoubtedly met with primary heart failure, just as Snow had many years before, and Professor Wood † says, "Chloroform is capable of causing death either by primarily arresting the respiration or primarily stopping the heart. . . ."

The experiments of Prof. McKendrick and Prof. Wood were like those of Surgeon-Major Laurie and Dr. Lauder Brunton, made upon dogs, cats, &c., so that there is no reason to account for their results being so diametrically opposite.—*London Dental Record.*

(*To be concluded.*)

* Although it is at least interesting in this connection to note that no less an authority than Professor Wood, speaking at the International Congress in London, 1881, stated that he found a great difference obtained in American and English dogs as to their behaviour when experimented upon with drugs.

† International Medical Congress In Berlin, 1890. Address of Anæsthetics, "British Med. Journal, No. 1,546, p. 886.

ARTICLE IV.

RESUSCITATION OF THE APPARENTLY DROWNED.

The *Medical Record*, Nov. 8, 1890, says:. For the revival of persons who have been nearly drowned, two chief methods (with numerous slight modifications of each) are in use: the "Sylvester" and the "Marshall Hall." In 1862, a committee appointed by the Royal Medical and Chirurgical Society of London, to consider the rival claims of the two methods, reported in favor of the method of Sylvester, on the ground that the amount of air introduced into healthy lungs by this method was double that introduced by the method of Marshall Hall. The committee recommended that the body should be placed at an angle of thirty degrees, face downward, with the head lower than the feet, the mouth being open and the tongue drawn forward. The escape of fluids might be assisted by slight pressure on the back. After a few seconds the body should be laid back downward with a cushion under the shoulders, the tongue hanging out of the mouth. About fourteen times a minute the arms should be drawn above the head and then lowered and pressed, by the elbows, against the chest.

In the Transactions of the above-mentioned Society for 1889, Dr. Bowles criticises very earnestly the conclusions of the committee, which had been endorsed by the Society. The committee based its report upon experiments made with the *empty* lungs of animals. The physician, however, has to deal with human beings whose lungs are filled with fluid, mixed with air in a blood-stained froth. Under these conditions the most useful method must provide not only for the inspiration of air, but also for the escape of this frothy liquid from the deeper air passages. The sudden introduction of a large quantity of air by the

Sylvester method is injurious, because at the same time the froth is drawn deeply into the finest tubes, which before contained a little air. By the Marshall Hall method, however, the air is introduced gently and in small quantities, and the froth is not drawn in more deeply, but is gradually expelled with each expiratory movement. Dr. Bowles supports his statements by the recital of a number of cases which he has treated.

After the patient has been placed for a moment with face downward to allow the escape of water from the mouth and throat, he is turned on the side and *kept on that side* continuously, except when (about fifteen times a minute) the body is rolled for a few seconds upon the face again. By *keeping the same side always up* the lung on that side becomes clear. Turning first one and then the other side up is dangerous, because thereby the partly cleared lung is suddenly flooded with fluid from the lung which was downward. It is better to clear one lung entirely than to have both half cleared. Each time the body is turned upon the face a little more froth and water escapes from the mouth and nostrils. If one lung is thus cleared it may escape the inflammation which results from the inspiration of water. When the upper lung has been almost cleared, Dr. Bowles finds it useful to raise the upper arm above the head as in the Sylvester method, since the entrance of larger quantities of air into the lung is now safe. Pressure on the back at each pronation assists the escape of water somewhat, and it has a good influence on the heart, aiding the propulsion of blood towards the lungs. The continued use of the pronolateral method is an excellent mode of keeping the pharynx clear of obstruction.

Editorial, Etc.

WONDERS OF SURGERY.—The wonders of surgical success continue to multiply. The doctors are now sure that the famous operation of skin grafting has succeeded. The flesh of the dog and the boy have grown together. About ten days ago an inch of the tibia bone of John Gethius, aged fourteen, was removed, and a corresponding length of the bone of a dog's foreleg was put in its place. The ligaments of the dog's and boys' legs were sewn together, and since that time the boy and the dog, which has been named Charity, have been lying side by side, waiting for the bones to unite. The hiatus in the shin bone of the boy will now be filled by the transplanted shin of the dog.

At the Roosevelt Hospital two extraordinary operations have been performed for cancer of the throat. Ex-Senator Peter Ward, of Newburg, had his entire tongue cut out by Dr. Charles McBirney. The doctor cannot say that the operation will be a success until some time, or that the danger of so critical a strain is over. At the same institution Dr. W. T. Bull recently removed a patient's larynx for cancer of that organ. He has since steadily improved. The surgeon is now to provide him with an artificial speaking apparatus. A silver tube slightly curved has been made to enter the opening left where the larynx had been. This passes down to the cut top of the windpipe. The tube was made in such a way that another tube, smaller and more curved, connecting with it, put in separately, could be passed into the same opening and upward into the back part of the mouth, partly filling the cavity occupied formerly by the larynx, and connecting the first tube with the interior of the mouth. After these tubes were put in place the tracheotomy tube was taken out of the windpipe and the orifice closed; then the patient could breathe through the mouth.

The surgeon then procured a hollow plug to fit the tube that runs into the mouth. In this a reed like the tongue of a

harmonica vibrates in a distinct tone and note when the outer orifice is closed, and the air drawn in at the mouth, through the two joined tubes, into the lungs, and from the lungs expelled in the same manner. But it is not an easy matter for art to replace nature, and, as might be expected, the doctor at first experienced some trouble in fitting this reed. But the patient can now talk almost as well as ever he could, though his voice is a monotone, taking constantly the pitch of the reed. Should his voice fail him new reeds can be put in at any time. After the success of the new shin and the new larynx efforts there seems nothing in the range of surgical possibilities that cannot now be accomplished.

. Since the possibilities in skin-grafting first became evident to surgeons a great extension in plastic surgery has taken place. The bones of men's fingers have been stuck to their noses when the nasal bones have been removed for some sufficient cause. Union between the finger and the nose has followed; then they have been cut apart by the surgeon's knife, leaving a piece of finger-bone to act vicariously for the lost nasal one.

This bone transplanting from one part of the human body to another has been so successful as to suggest the substitution of the bone of one of the lower vertebrate animals under practically similar conditions. So far as is known, the first operation of this kind was performed a short time ago in the Charities Hospital, on Blackwell's Island, by Dr. Phelps, assisted by Dr. Kelly.

The case was that of a boy of fourteen. The larger bone of the two which connect the knee and ankle joints was wanting for an inch of its length near its lower end. Efforts had been made in a previous operation to spread the bone between the points of separation, so that a healthy and strong enough backing should grow naturally on it, but without success. The boy was healthy, and, it seemed to the eminent surgeons, a suitable case for trying the experiment of substituting an inch of dog's bone for the hiatus in the human one.

The right forepaw of a dog was painlessly removed under anæsthetics and an inch of the lower end of the skin-bone was cut off without detaching the muscles and with great care in order to preserve the nutrient artery of the bone intact.

Then Dr. Phelps cut down on the boy's shin-bone so as to expose the gap in it. Then the inch of dog's bone was let into this space and fastened at both ends by silver wire. Both boy and dog had previously had their contiguous limbs rendered immovable by plaster of Paris bandages.

Dog and boy must remain together until there has been complete union established between the circulations of the adjoining bones. In order to accomplish this object the muscles and blood vessels of the dog's bone have been preserved as far as possible. This is to keep the bone alive until it has been invaded by millions of human capillaries which ought to spread over it from the surrounding tissues in the boy's leg.

At the end of some time it is probable that this union will so far have taken place as to allow the muscles and blood vessels connecting the bone with the dog to be removed. Then the patients will be cut apart and the healing process of nature allowed to go on independently in each case.

The boy was in excellent health two days after the operation, and there is no doubt about his recovery. Unfortunately, the dog's condition is not so favorable. In order to keep him sufficiently immobile to permit of the success of the operation, his body was put in a plaster of Paris jacket. This enforced restraint has told on his health.

Bibliographical.

DESCRIPTIVE ANATOMY OF THE HUMAN TEETH.—By G. V. Black, M. D., D. D. S. Publishers: The Wilmington Dental Manufacturing Company, Philadelphia. Price, $2.50. The author states in his preface that this work is designed to give a knowledge of the details of the specific forms of the human teeth—comprising the various surfaces and surface markings, so that a more complete perception of what compose the individual teeth of man may be acquired. The contents include Dental Anatomy—nomenclature, measurements of the teeth; the description of the various classes of teeth; the permanent and deciduous teeth; the pulp chamber in each class of teeth; arrange-

ment of the teeth; the alveolar process and alveoli; the peridental membrane and gums. Many excellent illustrations assist the reader, and the whole comprises an attractive volume of 153 pages exclusive of the index.

This work, beyond question, furnishes the most elaborate and comprehensive description of the human teeth and dental structures in direct relation with them, which has yet appeared in print, and reflects great credit upon its author, who is widely known for his extensive researches and valuable contributions to dental histology.

THE DENTAL LABORATORY.—A Manual of Gold and Silver Plate Work for Dental Substitutes, Crowns, etc., Regulating Appliances, Repairing, etc., with manipulations in Vulcanite and Celluloid, Laboratory Hints, Suggestions, Fixtures, etc. By Theodore F. Chupein, D. D. S. Publishers: Johnson and Lund, Philadelphia, 1890.

This excellent treatise is dedicated to the Students of Dentistry attending the various Colleges in the United States and to those contemplating the study of dentistry. The work is profusely illustrated, and in the 120 pages, of which it consists, contains a mass of useful information, the result of actual experience on the part of its author, who is well known by a series of articles which have appeared in the *Dental Office and Laboratory*, of which he is the editor. It has been the aim of the author in preparing the work to treat and select all such cases as occur in the every-day practice of the dentist, both in the construction of new work and the repair of old, and to present there in the simplest and most explanatory manner, and his efforts to this end have certainly been successful, as a perusal of the work will show.

TRANSACTIONS OF THE AMERICAN DENTAL ASSOCIATION at the 30th Annual Session, held at Excelsior Springs, Mo., commencing August 5th, 1890. Chicago, H. D. Justi: The Dental Review Co., 1890, Publishers. This is a valuable volume of proceedings, and includes instructive articles read before the Association with the discussions on each one.

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ARTICLE I.

A NOTE CONCERNING THE ACTION OF CHLOROFORM.

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(*Continued from page 378.*)

We are now in a position to examine in more detail the work of the Chloroform Commission, not because its experiments present any great novelty or reveal any unfamiliar facts, but because the systematic record of its proceedings presents to us a convenient centre about which to collect the knowledge obtained during the past few years in this country on the Continent, and the United States. Part II.* deals with experiments made, of which no graphic record was taken. 268 dogs and 31 monkeys were killed with chloroform which was given, under various circumstances, such as fasting after heavy meals, in different

* Lancet, Jan. 18, 1890.

postures, with and without inhalers. The animals all died from stopping of respiration, and, according to the report, an interval of time, varying from two to six minutes elapsed before cardiac movement ceased. Slow and prolonged chloroformization, asphyxial conditions, and struggling seemed to lessen the interval between the cessation of breathing and stopping of the heart's movements. The method of testing the failure of respiration is not mentioned; auscultation, and, in some cases, the placing of a needle in the heart muscle, was used to test cardiac action; while, in cases of doubt, the chest was laid open. Attempts at resuscitation were made after natural respiration had failed; but, as a rule, failed when resorted to after an interval of 60 seconds, being usually successful after 30 seconds' interval. The figures are: 'In forty-four cases successful, after an average of 28·2 seconds after respiration had failed; thirty-eight cases, unsuccessful, after an average of 31·5 seconds. These facts are highly significant. We shall see that chloroform acts directly upon the heart muscle, and up to a certain point this action can be carried without grave results; beyond that point one of two things happens: failure gradually results whether respiration goes on or not, or the heart remains able to maintain the circulation, so long as a low tension persists, but as soon as reaction occurs, and the general vascular tone revives, the greater stress laid upon the heart leads to the utter extinction of its action, and cardiac syncope takes place. The occurrence of death in this last way accounts for fatalities, common enough, occurring as the patient, after a surgical operation, is beginning to come round. The animals in which the respiration failed before the heart were, none the less, killed by heart-syncope, for, whereas the respiratory failure resulted from poisoning of the respiratory centres in in the medulla concurrent, action upon the heart-muscle was going on, and, although perfect artificial respiration was performed, the heart-muscle, being poisoned, failed. To understand this, one has to be familiar with the follow-

ing facts, which are daily noted in the physiological laboratory: that artificial respiration will keep a dog or monkey alive for hours, if the heart be not poisoned by chloroform even when the medullary centres are quite inactive; and, secondly, that dogs, especially, are difficult to save when once breathing has ceased, even though prompt resort be had to artificial respiration.

Again, the animals subjected to slow and prolonged chloroform, and those which struggled, incurred cardiac syncope most rapidly. Here, again, we find evidence of my contention. The prolonged action of the chloroform upon the heart led to the pathological changes which give rise to syncope while, in the struggling animals, a greater strain was imposed upon an already enfeebled heart, and hence early syncope obtained.

Turning to the experiments, the results of which were recorded by apparatus, we are informed that, in a certain number of cases, "the animal died accidentally before it was ready to be attached to the manometer" (used for taking blood pressure curves). These deaths, as was noticed above, may or may not have been due to primary heart failure.

The objects kept in view during these experiments were five in number:—

I.—To test suitability and safety of chloroform as an anæsthetic. To establish some comparison, experiments were made with ether and the A.C.E. mixture (presumably that of the Medico-Chirurgical Society Committee on Chloroform, 1864); but as the commission themselves admit the experiments were insufficient to afford a complete exposition of the action of these drugs, as a matter of fact the ether and A.C.E. experiments may be disregarded, for they are not only too few to be of the least value but were conducted in a very unsatisfactory manner.

II.—The effect of pushing the anæsthetics (*a*) to a dangerous degree, (*b*) until failure of respiration (*c*) to death.

III.—Modification in symptoms caused by anæsthetics when complicated by asphyxia; by pressure of other drugs the alkaloids, &c. These last experiments do not concern us.

IV.—To test the alleged liability to primary syncope, to secondary syncope, to reflex syncope through shock: the effect of fatty heart; hæmorrhage, &c.

V.—To test the effect of the anæsthetics on various animals, especially monkeys, as being the closest allied to human beings.

In eight experiments, animals were anæsthetized until death took place. The open method was employed and the anæsthetic pushed until respiration failed. It was noticed in these cases that the heart's action stopped about 3 min. 27.5 sec., on an average, after failure of respiration.

It will be noted that the animals were treated as human beings are treated, and it is not surprising they died in the most usual way, namely, from respiratory failure. All who have, like myself, had abundant opportunities of studying the behavior of dogs and monkeys under chloroform will recognize that the phenomena, somewhat elaborated by the commission, are very familiar, and even the relation of respiration to circulation will appear less novel than the report would seem to imply must be the case. In these experiments blood pressure fell, the heart, after primary stimulation, became feeble, the systolic contraction of the ventricles being gradually lessened.

The effect upon the heart of artificial respiration was experimented upon in the second series of cases. The average time elapsing between cessation of natural breathing and the failure of the heart was, in these experiments, 3 40-60 minutes (in one case 13 minutes,) and artificial respiration when commenced 52 seconds after the natural respiration had ceased (37 cases) resuscitation was effected. When tried in 46 cases after cessation of pulse, *i. e.*, 3 min. 5 sec. before cardiac stoppage (taking the average) it failed

in 17, succeeded in 29. When tried after cessation of cardiac movements it failed. The results are easily understood when we recognize a fact, which it would appear the Commission does not accept, that the actual heart muscle is itself affected. McWilliam * has shown that chloroform produces a dilatation of the heart due to relaxation of its muscle. Indeed, as we know, both voluntary and involuntary muscles are rendered flaccid and relaxed by chloroform, it is not surprising to learn that the heart muscle also relaxes and dilatation results. When, however, only a small dose of chloroform is given, dilatation is followed upon withdrawal of the anæsthetic by contraction. But if a larger dose is taken the heart muscle fails to recover itself, the dose of chloroform taken is only such a one as permits of the heart's regaining its tone, *i. e.*, dilatation is succeeded by contraction. When, on the other hand, where artificial respiration fails to restore vital processes, the heart has dilated beyond the point when contraction can subsequently occur; the dose of chloroform has been too large. What is especially noticeable, both in these cases and those met with in actual practice, is that individuals differ so largely in their power of resisting or recovering from the chloroform cardiac syncope. But when we remember that the tonus of the heart muscle is itself subject to wide vicissitudes, depending upon the health or disease of the individual at the time, one readily understands how it is that a fatal dilatation of the myocardium may occur at one time and not at another.

Experimenting upon dogs to investigate the question, whether reflex inhibition of the heart's action can be produced under chloroform by "shock," the Commission formulated the deduction that no such reflex inhibition of the heart's action occurs. They add, "it is impossible to produce syncope from chloroform in dogs." Even accepting the experiments as sufficiently numerous to be of much

*See British Medical Journal, 1890, vol. ii., pp. 831, 948, &c.

value, I can only say that the Commission's results differ from those of other observers and from my own experience. I have insisted both in this paper and elsewhere that dogs show great immunity from primary syncope, the result of reflex cardiac inhibition; indeed, we find that shock is revealed far more in highly organized than in lowly organized animals. The more complex is the nervous system the greater is its liability to suffer from shock. In the animal kingdom mutilations of the most severe character are sustained without the individuals being apparently any the worse, but such an immunity is enjoyed less and less as we ascend in the animal scale, until we reach man in whom, as is well known, severe pain or even subjective emotions are capable of producing syncope. In dogs, cats, and monkeys, whether under chloroform, or not, a true faint is rarely met with as the result of a fright, or reflexly through irritation of a nerve, and so far the results arrived at by the Commission would seem to tally with my own; but only so far, for we now know that the heart is always directly affected by chloroform, the result revealing itself in dilatation to which syncope must eventually succeed should the continuance of the anæsthetic be carried beyond the point of final resiliency of the muscle. In man, however, reflex inhibition must be accepted as a proved fact, and my own experience in the matter leads me to assume a dogmatic position, for I have again and again witnessed profound interference both with circulation and respiration caused by reflex when a patient was under chloroform. Dragging upon the spermatic cord, its division in castration, manipulation of pelvic, or abdominal viscera in laparotomies, section of the optic nerve in enucleation, all give evidence of shock under chloroform and cannot fail to impress any careful observer with the grave danger to the heart when insufficient of the anæsthetic has been administered. In dental operations again, where the shock occasioned by laceration of branches of the fifth pair of nerves is out of proportion to the severity of the under-

taking, there is an especial danger of primary cardiac failure through reflex inhibition. In the space at my command it is impossible to attempt to traverse all the tissues entered upon by the Hyderabad Commission, but upon the two main practical points to which I have addressed myself, viz., the Commission's contention that chloroform kills, not through the heart but through the respiration, and that shock does not, through reflex action, interfere with the heart under chloroform, I think we are bound to say that the Commission have failed to substantiate their position. And further, I would add that the so-called "conclusions" do not without grave reservation apply to human beings, while any attempt to make such an application is likely to lead to the most calamitous results by inducing a false confidence in the supposititious safety of the heart under chloroform, and by leading to a studied neglect of the signs of cardiac failure during administration of that anæsthetic. Much space and argument have been devoted by the Commission in the attempt to prove that the fall of blood pressure and weakened cardiac action from chloroform are themselves protective, inasmuch as they prevent a rapid circulation of the anæsthetic. Such a theory, however, must fall completely to the ground when it is recognized that the heart muscle and the arterial system are not a rigid series of tubes which can be regulated by a mechanism producing slowing or acceleration of their contraction, but are highly organized muscular tissue actually and directly affected by the chloroform circulating in the blood, and only capable of sustaining that injurious action to a certain point. The fall of blood pressure and the lessened cardiac action are phenomena of cardiac dilatation, and even if their occurrence prevented a fresh take in of chloroform they would, at the same time prevent a speedy elimination of the drug, such as would be necessary to ensure the after contraction of the heart muscle and maintenance of circulation. The indictment against chloroform, as it reads at present, is at

least so severe as to make one regard it as an agent too capable of producing dangerous cardiac derangement, to be used save by those trained in its administration, and under circumstances when other anæsthetics cannot be used.

But when we find that even in the hands of the most skilled and wary chloroform kills, and, further, when we are assured upon very high authority that this lethal power of chloroform is due to changes in the heart muscle visible to the eye and demonstrable to all, we are led to still further narrow the field of its use, and to say that chloroform should only be employed when other anæsthetics are unable to be exhibited, and when all precautions against a fatality have been taken. Much capital has been made by those who appear to regard any animadversion upon chloroform as a personal reflection upon themselves, out of the supposed dangers of ether. In one of the less known medical journals a considerable stir was recently made about ether deaths, and "the many dangers of ether" were therein vaguely cited. A prolonged use of ether and chloroform has led me to the following conclusions :—

I. Ether is incomparably less dangerous. Among the many cases one meets with in hospital, especially where the patient, broken down by illness, privation, or debauchery, has to take an anæsthetic and manifests alarming symptoms, hovers as it were upon the confines of death, most perils arise during the administration of chloroform. And, further, when such occurrences take place under ether the recovery is less tardy and less doubtful than under chloroform.

II. The after effects of ether are not what they are so often represented to be. Bronchitis, pneumonia, or nephritis are most rare. I cannot recall one in my own practice, and when they do occur they are generally due to excessive and reckless use of the anæsthetic.

III. Chloroform is incontestably the less disagreeable anæsthetic to take, and this has led persons to use it as an

introductory inhalation to ether, but the practice I believe is dangerous because the heart, weakened and relaxed by the chloroform, is less able with impunity to react to the stimulus of the ether. But the objectionable character of the ether is readily overcome when it is administered in combination with and succession to nitrous oxide, after the admirable method which we owe to the late Mr. Clover. This method also reduces the consumption of ether from a half-a-pint or more to one or two ounces for the duration of an ordinary operation. The importance of this becomes readily apparent when we remember that the lung and kidney trouble, to which reference is made above is dependent largely upon the quantity of ether which the patient inhales.

IV. It is easier to administer chloroform than ether, although anyone who will devote a very short time to the subject will readily enough master the use of Clover's small portable regulating inhaler. But, again, if it is easier to administer chloroform, it is still easier to kill with the use of this agent. In working with chloroform the point when urgent danger commences may be overlooked, but the contrary is the case with ether.

In conclusion, I may be permitted to say in what cases chloroform may be used. Accepting ether as our routine anæsthetic, except, of course, in dental surgery, in which nitrous oxide takes the first place, I should restrict chloroform to cases of prolonged operations about the jaw, tongue, mouth, larynx and trachea. In exceptional cases, operations for abdominal, thoracic, brain surgery may require chloroform, but I am dealing here rather with routine than exceptional cases. When chloroform has to be given, I believe free and even dilution of its vapour is of more importance than dribbling out the anæsthetic drop by drop, and so prolonging the period of "going off" and that of struggling. With care, the open method (that used by Sir Joseph Lister) answers well, but when, as in most of the operations named, the lint or towel is in the way

of the operator, I find the use of the apparatus made by Krohne and Sesemann,* and modified from Dr. Junker's original model, secures a fairly uniform dilution and is handy and easily worked.

Summing up, it is asked, shall we retract our belief that chloroform is not a safe and appropriate anæsthetic for the minor operations of surgery, such, for example, as those of dental surgery? I would reply in the negative, because, as I have striven to show, not one iota of fresh evidence has been advanced by the recent experimental investigations into the action of chloroform showing its safety, while much has now accumulated proving its extreme danger as compared with other anæsthetics. Of course, it may be said one death in three thousand is at worse a small mortality, and this is so; but while one would let a patient incur that risk for a major operation, which would itself suggest to the patient the idea of risk, one should, I submit, hesitate before permitting the patient to incur the risk when presenting himself for an operation such as tooth extraction, which he and the rest of the world regard as a matter entailing no appreciable degree of danger.—*London Dental Record.*

ARTICLE II.

TREATMENT OF ABSCESSES.

BY DR. FRANK OVERHOLSER, OF LOGANSPORT.

My interest in the subject of abscess has been considerably awakened by several cases of aggravated form of chronic abscess which have come under my observation. At the same time impressing me with the fact that the

* Shown at the Annual General Meeting of the British Dental Association at Exeter, 1890.

dental surgeon need not complain of responsibility at times, to say the least. I am indebted to several writers for the knowledge of the different forms of abscess, especially to Prof. Gorgas. Not hoping to bring out much, if any, new thought on the subject myself, however, I shall review the subject briefly, taking advantage of the help afforded.

The term "abscess" denotes a collection of pus in the substance of the tissues, and the formation of the acute form is as follows: The exciting cause, acting as an irritant, causes an afflux of blood to the center of the affection, and the distended capillaries pour out liquid exudation, which coagulates at the center into plastic lymph, expanding the meshes of the neighboring tissues with a more serous fluid. Leucocytes are formed from cell proliferation in the plastic lymph, but on account of their not being in proper place for their growth and development into tissue they become changed into pus, which collects in a cavity formed by it, and the result is an abscess. As these steps occur in quick succession, pain, heat, redness and swelling are present with a constitutional disturbance in the form of hectic fever. An abscess without the symptoms of pain, heat and redness is termed a cold abscess, and is dependent on a low degree of vitality. The alveolar abscess is, of course, the one we are most interested in, and is first indicated by pain, constant in character, which is increased at each pulsation, then swelling about the affected tooth, which becomes more defined, and afterwards points and discharges pus, when the active symptoms subside. If, after the symptoms of pain, heat and redness subside, small quantities of pus discharge through a fistulous opening, we have the chronic form of alveolar abscess. The location of alveolar abscess primarily is the apical space wherever it may afterwards extend. The manner in which the pus leaves its bony enclosure largely determines the difficulty of treatment. It may at once penetrate the soft tissues, which is the simplest form.

After the pus reaches the soft tissues the pain is greatly reduced, and the pain changes rapidly to swelling, sometimes distorting the face to a marked degree. This can be greatly reduced, and often wholly prevented, by the use of the lance, thus avoiding the second form, which forces the tissues of the gum from the bone and forms a cavity for itself between the two, or allows the pus to gain vent at the margin of the gums. This is the condition most favorable to necrosis, as the periosteum of the bone is raised to allow the pus to flow from the bone. In this condition the bone is deprived of its natural supply, and the result is death to that part. If the pus can be promptly discharged, however, not much harm will follow. This form of abscess in the lower jaw is more likely to point on the face than any of the acute forms. The same condition in the upper jaw, though less frequent, may point almost anywhere on the face after the pus has gained some headway in the soft tissues; since it follows in the direction of the least resistance, it may follow the course of a muscle to a surprising distance, thus pointing far from its source.

The third form is that in which the pus, instead of penetrating the surface of the bone, finds its way along the side of the root, following the peridental membrane to the margin of the gum, and is discharged at that point. When this occurs it destroys a large portion of the peridental membrane, after which the overlaying alveolar process quickly disappears. This can be recognized by passing a thin, flat instrument along the root of the tooth. Teeth suffering from this condition are most likely to lose their attachment and almost drop out, depending of course on the extent of the destruction of the peridental membrane.

In the treatment of any form of abscess, the first and most important point is drainage, to carry off the pus. This should be anticipated early if the abscess has not already pointed, that the location of the opening may be made at a proper point, thus avoiding an opening on the face. The

irritating cause should be removed, which, in most cases, is a putrescent pulp, or defective root filling, which may prolong the disease indefinitely, as chronic abscesses very rarely cure themselves in any part of the body.

The chronic form of abscess usually follows the acute if left to take its course, as the conditions that produced it are present to continue its supply. A putrescent pulp left in a tooth may continue its discharge of septic matter into the apical space indefinitely, thus necessitating a constant discharge through the fistulous opening, or if the fistulous opening closes up, the pus may form a cavity in the tissues and remain unobserved except a little soreness occasionally until extensive caries of the bone has been suffered. Certain forms of cold or blind abscesses are sometimes overlooked or difficult to diagnose. "Fluctuation," by pressing the fingers gently over the affected part in such a manner as to allow the pus to pass under the fingers, gives umistakable evidence of pus formation in such cases.

The discharge of the pus is the primary object in treatment. This is usually easy of accomplishment, except in certain blind abscesses or where extensive caries of the bone has taken place, forming a cavity in the bone. Once opened, it should be kept drained if the tendency is to close up. This can be accomplished by a cotton or wool tent twisted to proper size and saturated with some disinfectant, preferably of an oily nature. The pus will usually ooze out through the tent. If not, it can easily be removed, and thus avoid a second lancing. Some of the accepted disinfectants, such as bi-chloride of mercury, peroxide of hydrogen, oil of eucalyptus, phenol or camphol, phenique, should be freely used with a hypodermic or other medicinal syringe. If any necrosed or carious bone is found it should be freely removed. It is remarkable how quickly new bone structure will form in the maxillary regions if nature is only given a chance. Abscesses are often treated too long before surgical means are resorted to. We might as well extract the tooth at once as to attempt treatment

with necrosed or carious bone surrounding it. If the cause is present to feed it we can not hope to cure it. There is often much larger destruction of bony tissue in a chronic abscess than we are aware of, and simply forcing a pledget of cotton containing a disinfectant into an abscessed tooth is insufficient. The medicaments should pass through the whole course of the abscess, and this can only be accomplished by the use of the syringe. Peroxide of hydrogen is the best remedy in pus formations, as it has a perfect affinity for pus and destroys it. In the use of peroxide of hydrogen, it should be used until effervescence ceases. After all septic influences are removed and the parts kept free from such influences, nature does rapid work in healing.

With your permission I will speak of an aggravated case of abscess that came under my treatment. A young man of twenty-two years of age came to me for the treatment of an abscess that originated from a second molar. The tooth had been extracted four months when the case came to me for treatment, but the abscess continued. The pus had discharged all this time through a fistulous opening on the check, having destroyed large portions of the underlying tissue. The salivary duct had either been cut in lancing or was destroyed by disease, no doubt the latter. This discharged the saliva on the outside of the cheek, and flowed almost all the time. This was a most discouraging feature of the case. After making an incision on the inside to meet the remaining part of the duct, it would refuse to flow through its new opening into the mouth, but constantly gained vent on the cheek, and was only thrown into its natural channel by a silver tube being introduced at the natural opening and plastering up the outside escape with adhesive strips. The pus had three openings on the face, and was not able to direct its course to the inside, owing to the reduced vitality of the outer surface; it would always gain a new opening in the weakened tissues. The difficulty was caused by extensive caries of the bone, on which I

operated three times before removing sufficient bone to give a new start to the healthy tissues. The peroxide of hydrogen was my principal remedy, and I sometimes used two ounces before the effervescence ceased. Other remedies were used, but not so satisfactorily. The case healed nicely, and aside from a scar on the cheek the young man suffers no inconvenience.

DISCUSSION.

Dr. Hunt. The doctor has given us a very interesting paper, and certainly the case that he describes is very interesting. I will ask the doctor, what became of the severed duct? Was it established again? Did it perform its functions?

Dr. Overholser. Yes; that was my object in introducing the silver tube. The tissues had so wasted away that it would not pass through the old duct, and I perforated that and connected with a silver tube, and after a time it seemed to fill in around that.

Dr. Hunt. Forming a new outlet?

Dr. Overholser. Yes, I had some difficulty in getting it through. The main difficulty was in keeping the saliva from running down on the outside of the face.

Dr. Hunt. The ordinary abscess that the dentist meets with I think is that requiring treatment by drainage and the removal of the original cause of the abscess; and in a large majority of cases we know that that is all the treatment necessary. Even in those cases where it comes from the tooth (that is an abscess as we consider it,) with the removal of the fetid matter in the canal of the tooth and the healing of the part and filling it, without any further treatment, we will have a cure and establish good health.

There are other forms of abscess. The blind abscess —I think it is most easily cured, and the quickest way is to tap it from the alveolar process near the apex of the root, after which you can bridge, or drilling through the

end of the root. I have had very good success in doing that. I know that there are some operators that greatly prefer going through the outside, and I think that is necessary to a cure in those cases where you must evacuate all the pus before you can hope for a cure. I think the doctor covered the ground very thoroughly, and I do not now think of anything to add.

Dr. Wilson. I think the essayist is right in saying that we very often learn as much from a discussion as from a paper. I enjoyed the paper, and I think he has been remarkably successful in that operation that he speaks about, because I do not think that is a very easy thing to accomplish. There are certain classes of those cases that bother me very much. In a case of what you might call a chronic abscess, where the tooth probably had been filled for a long while, and there had been a little fistulous opening that did not yield to treatment, I simply began to remove the cause of the dead pulp where there is an opening into the pulp cavity, giving the abscess opportunity to secrete pus. While some men may be able to treat that abscess by immediate root filling, in my office it does not work very well. I think it needs something else besides simple treatment, and as Dr. Hunt has intimated, I think in some of those cases that there must be something else done. In many cases of that kind I think you will find the ends of those roots denuded of any periosteum. Very often there has been a little absorption, and after extracting the tooth you will find the end of it sharp, so that if the soft tissues had come against it, it would have irritated them, and I think you have got to do something else than to put medicine into the root or fill the root. I think you will never treat the tooth successfully so that there will not be any abscess there, or any pus secreted, unless you smooth off the end of the root in some way. I do not say that I do that in every case, but I have done it in a few, because I do not like to undertake to treat an abscess of one of the incisors and not be able to stop the formation of

pus. I do not want to see it in two or three months from that time with a little fistulous opening there. While there may not be much pus there, I know there is a little pus formed, because of the fistulous opening. Those cases I find hard to manage. While some people can cure them, I do not think I can. I think I can if I cut down and smooth off the end of the root and protect those tissues so that there will not be new tissues formed there. But abscesses of that kind I think are hard to handle.

Dr. Hunt. I had a case sent to me within the last three months of a tooth that I replanted nineteen years ago. I was glad to see the old fellow again. A number of years after it was replanted I took out and dressed off the ends of the roots, as all of you, I guess, have done. It remained there for a number of years, but I can not tell how long, before the abscess recurred. It did come back, however, and he wore the tooth for several years before it finally came out. He had it removed, not from the pain, but because the tissues were absorbed all around and it became an annoyance. It was a lateral incisor. I guess Dr. Hacker remembers the case.

Dr. Hacker. Yes, I remember it.

Dr. Wells. Had there been much additional absorption?

Dr. Hunt. There had been considerable on the end where I had smoothed it off years before and polished it. In the early days of replanting I think I met with a good many failures for want of antiseptic treatment. We did not understand it as well then as we do now, and a good many of these operations appear to me more successful to-day than fifteen or twenty years ago, on account of our better knowledge of antiseptics and their use. I remember replanting a tooth that a man had carried in his vest pocket, I think, two days. I simply washed it off and replanted it for him, but when I put it in there it suppurated most violently, and dropped out. It would not unite at

all, and I think that if I had that tooth to-day I could make it unite and be of service to him.

Dr. Wells. While I was very much interested in the paper, and I think it covered the ground pretty thoroughly, I would like to know how to diagnose a case thoroughly. I believe it is considered sufficient evidence if we find a fistulous opening opposite the root. Isn't that so considered?

Dr. Overholser. Yes, that is an alveolar abscess, and usually in a chronic form.

Dr. Wells. I had a case come under my observation of an abscess that was chronic, and had been discharging for a long time right over the root, and I usually conclude in such cases that there was an abscess resulting from the death of the pulp. In order to remove the cause, I proceeded to drill the tooth and take the filling out, and I found that tooth alive. What kind of an abscess was that?

Dr. Overholser. That was an abscess, possibly, of the very character that I spoke of, on which, for some reason or other (possibly from calcareous deposit destroying the peridental membrane) it had created a pus formation that had to be discharged at the margin of the gums, thus destroying the vitality of the peridental membrane, and not destroying the pulp. I would say that that is not properly an alveolar abscess; that is an abscess, but the proper place, the primary position for an alveolar abscess, is the apical space at the very apex of the tooth; and properly speaking, an abscess has its origin any place, else it is not properly an alveolar abscess in the best sense. But no doubt something irritated the membrane. It might have been regulations in early life, regulating the tooth, or some blow on the tooth that destroyed the membrane without strangulating the pulp, possibly.

In regard to what Dr. Wilson said as to the difficulty of treating some teeth, I have no doubt but all wise men will come to the conclusion that we can not save all teeth.

There are teeth of that character that come under that very head, where the peridental membrane is destroyed, with possibly considerable absorption of the alveolus, that is not in shape to hold the tooth, and if we conclude that it would be better to do as Doctor Hunt says, extract the tooth, remove the diseased bone, and put it back again, but that, of course, you know, is an uncertain operation, and does not always succeed. We can not hope to save all teeth. Sometimes it is a very difficult matter to cure an abscess, let alone save the tooth. Usually we can cure the abscess, but there is always more or less carious bone surrounding an abscess, and the vitality of the immediate parts is lowered to a great extent. It will occasionally slough off a little, and become very offensive for a long time, and there are some cases that we can not hope to save.

Dr. Hacker. I remember very distinctly the case that Dr. Hunt speaks of, about nine years ago. It was the first case of replanting I had ever seen. He gave me part of the work. I dressed the roots of it before replanting. I remember it very distinctly, and following that up, I became very enthusiastic over the removal of teeth and replanting. I followed it up very successfully, and do it yet. I think it is the surest means of stopping an abscess on the molars and bicuspids, and I have tried every way that I ever heard or read of. I would almost undertake to say that if you can make a good root drainage, you can save probably nine out of ten teeth by replanting. I had one case of a right lower molar about six years ago. The patient went to Chicago, and Dr. Harlan wrote me for a history of the case. I told him what I had done. He removed the tooth and put it back again. That was about four years ago. The abscess got well, and that was a tooth that had been replanted a second time. That you can call heroic treatment, but it is as much a success as treating an abscess through the tooth, or through a fistulous opening.

Dr. Oliver. I think Dr. Overholser deserves a great

deal of credit for his paper, from the simple fact that in the case he cites nine out of ten dentists would have failed to save the tooth. Dentists, as a rule, have great hesitancy in undertaking such cases, when they really know more about it and are better able to operate than any physician, and they know more about the organs of the mouth and the head in general than the average physician, and there is no reason at all why they should not attempt such operations. I think he cites the case of an abscess that formed after the tooth was extracted. Was the abscess there before —and then the tooth extracted—and the abscess returned?

Dr. Overholser. The abscess remained after extraction. That is frequently the case. I had something like that kind of a case come into my office about three weeks ago, where the patient said the tooth was aching, and there was nothing at all the matter with the tooth. It was in the second superior right bicuspid, and there was a large abscess which extended, I thought, into the antrum. There was quite a good deal of inflammation there. Two weeks ago last Sunday, with the assistance of Dr. Cross, I operated on him, and I succeeded in removing a piece of necrosed bone about the size of a butter-bean and very much in that shape. I got the dead bone out of there and treated it afterward for ten days with nestorine. I found nestorine one of the best antiseptic solutions that can be used. Nestorine has a great deal of drastic qualities in it. It was a complete cure after ten days. I saw the case Saturday and there was nothing there but a scar on the gum.

Dr. Oliver. I would like to ask Dr. Overholser what he would do in the case of an antrum abscess, an abscess either of the bicuspids or molars and afterward filled with pus? I would like to have light on the question as to the right way of treating it. I have had such a case recently.

Dr. Overholser. The principal difficulty in treating an abscess of the antrum is to give vent to the pus. Of course, if the pus has remained there a long time and be-

comes very offensive and unhealthy, it might destroy the membrane to such an extent that it would become serious enough to remove the floor of the antrum. But usually if it is affected and the abscess is really caused from the tooth, the extraction of the tooth and drilling through the lower floor of the antrum will allow the pus to escape, and the antiseptic washes that we have, such as nestorine and the phenols and mild carbolic acid wash in such cases, are about the best to use. I have had several cases of antrum difficulty. They are oftentimes seemingly the outgrowth of catarrh, in which the membranes have become disintegrated more or less through the catarrhal affections, and that is caused probably by the fact that an unhealthy condition of the membranes is produced and the opening is so small that they are swollen shut, and it becomes offensive from the lack of ventilation. As soon as ventilation is brought about the disease is likely to subside. I have usually extracted the tooth, though sometimes it has been in above the tooth in the antrum.

Dr. Brown. We have the benefit of having with us a newly-acquired member, who has distinguished himself in the treatment of the antrum. He has this last month effected a cure where an oculist of considerable reputation had failed, in a case where the orbit of the eye was involved. He is present with us this evening, and can give us a great deal of important information. I know his practice is distinguished. His name is Dr. J. D. Coyle, of Fort Wayne.

Dr. Coyle. Gentlemen, I could not address you; it is out of my line of business. I have succeeded in practicing, but I really could not speak. I am a self-made dentist, with no instructions from any one outside of my own practice, and I am not able to speak.

Dr. Overholser. Will you tell how to treat an abscess?

Dr. Coyle. If you want to know my treatment, aromatic sulphuric acid is my main remedy.

Dr. Overholser. How do you apply it?

Dr. Coyle. I apply it with a hypodermic syringe.

Dr. Hacker. Through what kind of an opening?

Dr. Coyle. It is always an opening with an instrument. If there is not an opening, I make one.

Dr. Hacker. Where?

Dr. Coyle. In the most convenient place. By removing the tooth usually.

Dr. Hacker. Do you usually make more than one opening?

Dr. Coyle. Usually two.

Dr. Hacker. I have never found it necessary to make more than one opening.

Dr. Coyle. In twelve years I have had fifteen cases. One case was perfectly plain. It had been treated by Terre Haute and Indianapolis oculists for six years, and they never discovered the difficulty.

Dr. Hacker. Do you generally open up through a bicuspid or a third molar?

Dr. Coyle. I have had more cases that are caused by the second bicuspid than by the first or second molar, or even the third. I had a case this spring. It was a tooth that was filled twenty years ago, and it seemed that for twelve years it had been paining him a little. I made an examination and removed the tooth. I told him before I removed it that I thought the root was destroyed and found it so and removed it, and the instrument broke off in the root. That still remained, but the root was absorbed away from it probably a quarter of an inch. I had easy access to the antrum, and treated it six weeks, and pronounced it well.

Dr. Hacker. In what condition did you find the antrum after taking out the tooth?

Dr. Coyle. I could not explore it from the third molar, any further than just the socket there. Of course I found the bone slightly carious. That I could discover with the probe.

This recent case that I had was that of a merchant of our city. About three months ago he was attacked with a hot water discharge from his eye. It would run down so hot that it scalded his face. He went to our best oculists. They treated the eye directly. I do not know what remedy they used. They treated the eye, and also wanted to operate on the tear duct for the discharge of pus. When he came to me he was wiping away a tear every minute or two. I made an examination, and found that in the second bicuspid that I had filled some six or seven years ago the pulp had died in the meantime. I do not know why, but on percussion I found that that was the original cause of trouble, and told him so, and removed the tooth, and found the root absorbed, and a little fungus growth came with it. I could not get access to the antrum, but introduced one drop of aromatic sulphuric acid, pure, with my syringe, and cauterized that sac. I have had three cases without boring the floor of the antrum. I use diluted sulphuric acid, ten to one. That is only one case in several that have come through the hands of physicians who have treated them for months.

Dr. Overholser. What symptoms do you regard as the most reliable in diagnosing a case?

Dr. Coyle. Usually in the morning when they rise and blow their nose, there will be a little drop of blood come from the side of the nose. That is one. In women and all delicate people there will be a little pink flush probably over the antrum. But you will never find two cases alike; I am sorry the doctor called your attention to that, but when you were speaking of it I was anxious to hear you gentlemen and old practitioners and educated men talk about the matter. I have never had any opportunity to hear anybody on the subject.

Dr. Overholser. These cases had never been treated until you treated them?

Dr. Coyle. They had never been treated—you mean after they were treated by these eminent men?

Dr. Overholser. Not by dentists?

Dr. Coyle. No, they were mostly general practitioners.

Dr. Hunt. As to the subject of diseases of the antrum, I think we very often have slight diseases of the mucous membrane of the antrum when we do not know it and the patient does not know it, and we know that the roots of the molars and the roots of the bicuspids frequently make an impress in the floor of the antrum. Now, when those roots become affected, and affected with abscess, is it not very surprising that we do not have more diseases of the antrum than we do? As I said before, I think there are a great many slight inflammations of the mucous membrane of the antrum that we nor the patient are not aware of. The treatment, of course, will be to establish a drain the first thing. The outlet into the nose being above the floor of the antrum, it does not give a very good drain, and if it ceases the disease is established there. But by the removal of the tooth you can generally get into the antrum through the alveolus. If it is necessary to open it, of course open it until you can get in through the bony tissue, and if there is necrosed bone there you can generally distinguish it with a probe. It is easily detected when you come to it, and if there is no necrosed bone the cure will very frequently be effected by simply establishing a drainage through it a little while without any further treatment. But if there is necrosed or carious bone there you must take it away before you can hope to get a cure.

Now, as to the introduction of aromatic sulphuric acid, if there is not a great territory involved in the disease, remove the carious bone and you will make a cure without an operation further than the opening into the antrum. I just dismissed a few days ago a case that was sent to me from Chicago, being that of a lady who removed from Chicago to Indianapolis. Her case appeared to be very aggravated when she came from Chicago, but we found after the first examination that it was complicated with a

very considerable disease of the air passage of the face, extending from the antrum. The abscess on the end of the root was evidently the cause of the disease of the antrum, and the tooth had been removed in Chicago, and had been treated some weeks, and still there was not much improvement, so the patient said. Dr. Swain, who had charge of the case there, gave me a history of what his treatment had been, and the lady, I think, was under treatment at Indianapolis only a short time, probably ten days or two weeks, when we got the discharge from the antrum stopped entirely, but the trouble seemed to be in the frontal sinus and the passages therefrom. She had a weeping of the eye on the side on which the antrum was diseased, the fluid running down out of the eye onto the cheek and scalding and blistering the cheek, and all those symptoms which are so distressing, but under the treatment of aromatic sulphuric acid it yielded very kindly.

I have in my hand here, handed to me by Dr. Chappell, a little vial containing some specimens of teeth. He did not say what they were, but I take them to be replanted teeth. They have the appearance of having been absorbed, some of them, as deciduous teeth. Now, whether he proposes to exhibit those to prove that the operation of replanting is a failure, I do not know, but I have seen just such cases as these from replanted teeth and from transplanted teeth. And yet I do think that in many cases the operation is one that ought to be resorted to rather than suffer the loss of the teeth. We ought to take the chances, and if it succeeds is it not better than to remove the teeth entirely and put in a plate or bridge or otherwise? I think it is if there is a hope or chance of saving it by that method. I would rather take the chance, even though it should be a failure, than remove the tooth entirely, for fear of such results as that.

Dr. Chappell. On the subject of the doctor's essay, I always feel as if it was a duty that we owe to each other not to criticise. But in all our expressions, physiological

or pathological, we should keep close to the text, so as to convey the proper meaning. The first thing my attention was called to in his essay was the fact that pain turned to swelling, if I did not misunderstand him. Pain, heat, swelling are symptoms of inflammation, but not the physiological phenomena leading to inflammation. Now, it is true that in the pain of the tooth, the parts being so confined, it would be more painful coming into the soft portion where there is an expansion of tissues, and if there was any determination of blood there and separation of the elements there would of course be that phenomena, and would be less pain when the swelling commenced.

On the question of the phenomena of an abscess, I differ somewhat with him in regard to describing the phenomena leading to an abscess. As to the putrescent pulp being the recurrent cause of the abscess there, I think that is a question.

There was another expression, in speaking of an abscess having a fistulous opening. An abscess ceases to be an abscess whenever any drainage commences. Then it becomes ulceration. Whenever there is a fistulous opening from an ulcerated peridental membrane, it is no longer an abscess; it is an ulcerated peridental membrane, with an alveolar fistulous opening. A blind or cold abscess is what we generally know as an abscess that has its opening through the canal. It has some microscopical drainage A cold abscess is not, as I am inclined to think, a modern way of expression. The caries and necrosis of the apex of the root, sanguinary deposit on the denuded portion of the tooth that Brother Wilson speaks of, is one cause of chronic ulceration of the peridental membrane. There are a great many gentlemen, in the clinical part of the discussion, who have great success in the treatment of abscesses, after they have formed an artificial opening, by the use of gutta-percha; even in the fistulous opening of an ulcerated peridental membrane, wherever there is a possibility that there is an absorption of the apex of the tooth, and some of the

sanguinary deposit around near the line of life of the tooth, by floating or flowing of the cavity with liquid gutta-percha, even until it comes out through the fistulous opening. What becomes of it? There will be a certain amount of the flowing gutta percha that will be deposited around the end of the root, and a cystic membrane will be formed. A cystic membrane is just as much tolerated within the body of the tissues as almost any other membrane is tolerated. I think that in the case the doctor speaks of, where it comes through the cheek, there was more or less ulceration there of the salivary gland, was there not?

Dr. Overholser. I do not think it would interfere with the gland, because the gland would be back under here (indicating with finger), and this difficulty was away down in the cheek, and came from the second molar.

Dr. Chappell. A superior molar?

Dr. Overholser. Yes, sir.

Dr. Chappell. In making its track, it cut down into the muscles, didn't it?

Dr. Overholser. It got down to the muscles of the cheek.

Dr. Chappell, Wouldn't it have remedied that by making an incision and making a new track right along by the alveolar border?

Dr. Overholser. That is what I did.

Dr. Chappell. There is where you made your drainage?

Dr. Overholser. Yes.

Dr. Chappell. And then you had the wound on the cheek. Did you get any cicatrix there?

Dr. Overholser. No, it is remaining in that condition. The vitality of it was so low that it certainly would not have been wise to destroy it. It only hung over the cheek, and I was afraid to leave it there.

Dr. Chappell. Dr. Bell and Dr. Hunt spoke of cases of catarrhal trouble. There are a great many cases of catarrhal trouble of the antrum that no doubt is there at

the time it gives its trouble, and we have a great many cases of perforation of the floor of the antrum and caries of the walls or aperture. Now, we know that whenever the calcific granules or ossific granules, either one—wherever there is caries, and of course wherever we have necrosed bone we have more or less carious bone, and of course the operation of cutting out there is nearly always a disfigurement. I have a case now of a patient that gives trouble. The second bicuspid is gone and the entire cavity is open with more or less ulceration. I find that drainage does not stop it, and that the vitality of the patient is such that I have not much hope of recovery. Your cases, doctor, (addressing Dr. Coyle), I believe, were where the patient was in reasonably good health, were they not?

Dr. Coyle. Some were, and some not. In one case I spoke of, a Sister of Charity, her flesh was very much reduced, and she was in a very nervous condition, so that she had to be helped up the stairs. After she was restored she regained her flesh, and she is now as healthy as ever in her life.

Dr. Chappell. We do not pay enough attention in the treatment of chronic ulceration to ascertain the fact whether it is only the drainage from the antrum.

As to these teeth that I have filled here (exhibiting specimens), out of forty-three replantations these are the only failures that I have had) these are the only ones that came back to me. I do not know how many the rest of the dentists had. These cases, we found, with the exception of the bicuspids, were the result of injury. That bicuspid stayed in until the gentleman spent a term in Princeton College, and after he graduated and came back, says he, "Doctor, I have the finest little specimen here that you ever saw in your life." I said, "I have been afraid of that specimen," and he simply took that tooth out and showed it to me and he wanted me to look in his mouth, and there was the nicest little cavity where the tooth came from. He put it back again, and went on wearing that until at last he got

to taking it out and putting it in so often that it would not stay, and he came to me, and the membrane lining of the cavity was as nice as any mucous membrane. These others were the result of injury, and then secondary restoration took place.

There is restoration. There is no doubt about that. In this case here the party came to my office with a very sore front tooth. The gum was blue, and he said, "It has been giving me a good deal of trouble. It is very loose, and I would like to have you do something for it." I examined the tooth and told him it was quite loose. Says I, "I think the best thing to do for that is to take it out. Let me take it out." I just took hold of it with my fingers and pulled out the tooth, and that piece of bone with it. It fitted the tooth which you see here. There is a pivot tooth there which had been worn in the mouth two years, which had been done at Washington, Pa. The tooth had become inflamed, and the processes had become carious and necrosed, and an entire piece of the outer wall exfoliated, and all you had to do was just to take it out. I cured it in a few days and put in a plate. That is simply a reminder to be very careful when you are setting a pivot tooth not to go through the wall.

Dr. Overholser. In answer to Dr. Chappell's objections to my paper, I labor under one disadvantage, and that is that I trusted a little too much to my memory in preparing the paper, as I have written more than half of it since I arrived here to-day. But I believe that Dr. Chappell will not find the text books to substantiate his statement that an abscess is no longer an abscess after it has discharged pus in a fistulous opening, but becomes ulceration. I am confident of the fact that that is the true form of chronic abscess. Where it first forms an opening on the outside of the gum and relieves itself, it is an acute abscess; where the flow continues, it is a chronic abscess. And as to my statement of the pain changing to swelling, I did not wish to express that there was any action there that changed

pain of a material character into swelling of a material character, or that one was transformed into the other. It may be that I did not clearly express myself in the paper, but I meant that where we have pain as the pus is working through the alveolar process, when it strikes the soft parts the symptoms, not the pain, changed into swelling. Dr. Chappell says that at this point we find increased pain. That, I think, is an error.

Dr. Chappell. No; swelling when the pain ceases.

Dr. Overholser. That is the statement I make in my paper, and I understood you to say the reverse. The idea is that when the pus passes through the bony tissue and gets into the soft tissue, there is so much resistance and secondary swelling, and as soon as it stops swelling it ceases to pain. That was my experience.

As to the other techanical terms in the paper, I might have expressed myself a little more in accordance with the text books. The terms selected were just as they came to my mind, because I was away from my text books. But I do not believe that they were strictly unprofessional expressions. I thank Dr. Chappell, however, very kindly for his criticism, because it is a subject that I am interested in, and I like to see it brought out, and a friendly discussion and criticism makes us all better men.

Dr. Chappell. I did not wish to find fault with the gentleman, only that I wished to criticize in a general way the expressions. You will notice some expressions in our text books are the same expressions that were made thirty years ago, and if you take some of the advanced writers in the general text books over the country you will find that these are rather more critical than some of our text books. Now, there would be no necessity for revision of our text books if it was not for the correction of errors. Those of you that have been writing for years, when you go to a text book you will very frequently find the same thing copied from one book to another, and it is not satisfactory,

and by reading a great many on the same subject you will find once in a while an author that comes out plainly and is very technically expressed. I know that some of our text books, on the question of abscesses, treat an ulcerated peridental membrane as an abscess, and yet they are speaking clinically and plainly instead of technically and didactically.

Dr. Overholser. How would you define a chronic abscess, or wouldn't you allow a chronic abscess to exist?

Dr. Chappell. A chronic abscess is not, critically and techanically speaking, an abscess. Why? If you will take all the authors, I think they are generally settled down on the definition of an abscess as a collection of pus circumscribed by a wall (or a solid wall, as some put it) and effusion. Now, to begin with the question of irritation and determination of blood; stasis and the separation of the elements of the blood, the formation of effusive granules and the changing of the leucocites or white blood corpuscles into pus corpuscles, we have then in some way the metamorphosis of the tissue—tissue changed into pus. There are so many things that might be said on the subject, but I do not wish to take your time.

Dr. Wells. I would like to ask Dr. Chappell how many authors he has consulted that give the definition of abscesses that he has given us?

Dr. Chappell. I think I have possibly a dozen or more, that is, on the same line of treatment.

Dr. Overholser. I think if there is anything to be lamented, it is the technicality of our profession. I am a subscriber to four or five dental journals, and I find a great diversity among good writers and good thinkers, as to the language of technicality, and sometimes I think we (not in this case, Dr. Chappell), as a profession, belittle ourselves by dabbling into a thing so fastidiously that we can not find terms to express it. For instance, when we made the change from nerve to pulp. One of my journals speaks

of the matter of changing the name from nerve to pulp, and what an unfortunate thing it was, since pulp expresses nothing, as it were, only a mere body, protoplasm, or something of that kind, and as we are working on a patient's tooth, and he says: "You are striking the nerve, aren't you?" "No, no; that is not the nerve." "Well, there is feeling there. Isn't a nerve the center of sensation." "Oh, yes, but that is not the nerve." Then we go a little further, and then we get into the nerve proper, and give considerable pain, and that still is not the nerve, but is pulp. The active part of the pulp is nerve structure, and it seems to me, after all, that nerve is a much better name than pulp, because we are dealing with the nerve. I am getting tired of telling patients that "That is not the nerve, but it is the pulp; that that is not nervous sensation, but is pulpitis, or something of that kind."

Dr. Chappell. Pulp sensation. Still we know we are getting into the dentine. The dentine is very full of sensitive fibrils.

Dr. Overholser. The whole tooth is ramified with some nervous tissue, or transmitting power, and it certainly must be something that transmits pain to the nerve centers, and must be a nervous force. There may be a nervous force existing between you and me, and yet we can not cut it and make it bleed, or anything of that kind.

Dr. Wells. While we are on this technical business, I would like to ask Dr. Chappell, what kind of a definition he is going to give to this ulcer where the destruction has proceeded further than the peridental membrane? He speaks of ulceration of the peridental membrane. I did not know that it extended further than the peridental membrane. Then what kind of ulceration is it when it is between the walls of the bone?

Dr. Chappell. Caries of the nerve structure.

Dr. Wells. Suppose it has got to the bone of the membrane, and the bones are not dead, and the abscess forms there?

Dr. Chappell. The peridental membrane or the periosteum?

Dr. Wells. No, sir; the periosteum?

Dr. Chappell. Most generally it is ulceration of the periosteum.

On motion, the subject was passed, and the Association adjourned until 9 o'clock tomorrow morning.—*Indiana State Dental Association.*

ARTICLE III.

THE EFFECTS OF MERCURY ON THE TEETH.

BY E. D. MAPOTHER, M. D., F. R. C. S. I.

It is difficult to over estimate the importance to dentists of questions bearing upon the prophylaxis of diseases of the teeth, so that no excuse is needful when such as that involved in the title of this paper is taken for discussion.

A large experience of the use of mercury in the treatment of syphilis, and of psoriasis and some other skin diseases, convinces me that its power of injuring the teeth has been greatly over-rated.

A hundred years ago it was given so rapidly and in such large doses, especially by quacks, that dire results were reported, and this most potent of remedies fell into undeserved disrepute. However, so recently as 1862, Professor Laycock taught: "It is a question how far the administration of mercury in early childhood or even to the parents during impregnation or growth of the ovum affects the form and development of the teeth." The male parent cannot have been meant, for no one could believe that the spermatozoon, wondrous as are its influences on the offspring, carried enough of the metal to harm the second set of teeth. From the mother the fœtus could scarcely

receive, or still less could the infant store enough to interfere with the stages of dental development, the final one, that of calcification, not beginning until the sixth month in the first permanent molar.

As an example of the rapid change of scientific opinion, the following seems most noteworthy. The Government Committee on Venereal Diseases, 1864, having been instructed to inquire into "the best antidotes to injurious mercurial action," reported that any reference to the subject was almost unnecessary, and the voluminous evidence offered to it does not allude to the point.

With regard to iodiosyncrasy, I have never met a severe case of mercurial stomatitis which could be thus entirely accounted for. There had existed some discoverable cause, such as great debility, or undetected albuminuria in the general system, or some faulty condition of the teeth.

Irregularity and crowding of the teeth, giving rise to chronic gingivitis, and erosion, caries and encrustation of them, so soon encourage salivation, no matter how carefully the drug is given, that in all cases where delay is permissible, the dental surgeon should treat these conditions before a mercurial course is commenced. If severe salivation ensues from these exciting conditions, the physiological and curative effects of mercury have not been produced, yet the drug must be discontinued, and in acute diseases recovery is retarded and even loss of life may result.

My practice, therefore, not having afforded opportunities of witnessing the destructive results occasionally reported, most of the observations which follow refer to the cases of mirror-makers, whose sanitary conditions I have extensively inquired into. By them minute particles of the metal or its oxide are inhaled, and the gums and teeth suffer sooner and more surely than after administration by the skin or stomach. The edges of the gums swell and separate from the necks of the teeth, then they

become spongy and hæmorrhagic. Between their everted ulcerated surfaces and the conical roots, pouches are formed, which lodge, especially in the case of the lower teeth, many products which tend to destroy the alveolo-dental membrane, the ligament of the gomphosis joint, which at the neck is especially vascular. The teeth then gradually loosen and fall out. After this, these reckless artizans follow their pernicious occupations, for the mouth gives them no further trouble. The same is recorded as to quicksilver miners.

It is very hard to produce salivation in the elderly, who are wanting in teeth, and, as all know, in the infant or young child, and the reason appears to be that the unbroken surface of the gum does not allow the access of air to, or the evolution of some gas, possibly chlorine or hydrochloric acid, from the mercurial compound. Amongst the many syphilitic infants for whom I have prescribed mercurial inunction I have never seen any stomatitis, the liver and bowels only having shown signs of its action; besides, it is undoubted that mercury may act directly on the sympathetic system and produce salivation without any local irritation. Light also appears to be promotive of such clinical change, for the effects are never so marked round the posterior teeth.

It is not fully determined in what exact form mercury circulates in the blood: that it is as a chloride, with sodium also as a base, is generally believed. By this compound, after undergoing some chemical change, the albuminoids of the tissues round the teeth would be destroyed, the vessels of the inner surface of the gums would bleed, and the cementum would die from want of vascular supply, and then blacken, as does a piece of dead bone exposed to the air. Reducing agents, such as sugar, change mercuric into mercurous salts: chlorine or hydrochloric acid would be set free, and either of these may be the destructive agent. If a ferment, which is likely to be present, were added to the latter, a digestive fluid capable of dissolving cementum would be afforded.

The whitish sticky stuff about the roots of the teeth during salivation is an albuminous substance undergoing decomposition and thereby emitting much fœtor.

It has been said that a single dose of mercury has produced toothache, but I can find no authority for the statement and no evidence whether it resulted from the drug injuring the nerve when falling into a carious cavity, or brought to it through the circulation.

Enamel, with its ninety-seven per cent. of earthy matter, cannot be susceptible of injury by mercury, and it is also proof against the attacks of bacilli, which undoubtedly can feed on the gelatin of the cementum and dentine. There is much reason to suppose that these destroyers give rise to the evolution of some acid, probably lactic, which acts on the lime salts. The indestructibility of enamel is well exemplified in the teeth of the mastodon, which have been buried for thousands of years.

There are some who believe that the loss of teeth, together with necrosis of the corresponding part of the alveolar process, which is occasionally, but rarely, seen amongst mirror-makers, is the result of merely the anæmia which mercury produces, and which firstly shows itself in the pale bloodless gum. The similar mischief, which is sometimes seen in the course of the eruptive fevers of children, has also been attributed to the poor condition of the blood, but more probably the specific poison has attacked the teeth because they are part of the dermal system. If a dose of mercury has been given, the opponents of that remedy would lay the blame on it.

It may not be out of place to mention that the French process of making mirrors by the precipitation of silver is entirely harmless, and an article at least as good and as cheap is obtained. If our workmen are still to use mercury, their factories should be provided with every possible means of allowing the particles and vapours to escape, and they should be compelled to change their clothing after work, and to take daily baths. The skin can, if urged into

complete activity, eliminate much of the poison. In the many cases of mercurial stomatitis among mirror-makers, and the very few resulting from the use of the medicine, which I have seen, stoppage of the exciting cause, free exposure to air, and the frequent giving of albuminous foods, have rapidly produced amendment.

As to the local treatment of the diseased gums, it is difficult to speak with confidence until the chemical changes which occur in them shall be absolutely determined. Good effects follow the application with a very soft brush, firstly, of white of egg to neutralize the mercuric salt, and secondly, the washing of the mouth with a solution of common salt to remove it. Chlorate of potash is also a valuable remedy as a wash, in tablets slowly dissolved, or given internally. It is asserted that if used freely in the last-named way while mercury is being given, the gums never become affected.

Touching the hæmorrhagic surface of the gums with a pencil of nitrate of silver certainly checks oozing, and causes them to renew their normal hold on the neck.

To return to preventive measures, when mecury is used therapeutically, inunction or the pill form is far safer than fumigation, which really admits it, not by the unbroken cuticle, but by the mouth, much in the same way as when the injuries to mirror makers arise. This is the main point in the administration of mercury at Aix-la-Chapelle, for by ventilation of the rooms, open air exercise, ablution of the body and cleansing the mouth every two hours, the slightest salivation is avoided. Alum is there the favorite drug for local application. Although I do not believe the teeth suffer from the mercury in Stedman's powders and such nostrums, their use ought to be deprecated by every practitioner.

With regard to the mercury contained in amalgam fillings and vulcanite plates, no remarks are needed, as Sir John Tomes and a Committee of the Odontological Society in 1877 proved it to have been wholly guiltless of having caused salivation.—*London Dental Record.*

ARTICLE IV.

TANNIC ACID: ITS INTERNAL ADMINISTRATION FOR HÆMORRHAGE AFTER TOOTH EXTRACTION.

BY DR. W. L. ROBERTS, WEYMOUTH, MASS.

Tannic acid, as we all know, has a yellowish-white color and strongly astringent taste. It is decomposed and entirely dissipated when thrown on red-hot iron. It is very soluble in water and less so in alcohol and ether. Its solution reddens litmus and produces with solution of gelatin a white flocculent precipitate, and with solution of the alkaloids white precipitates, and is very soluble in acetic acid. Dose from three to ten grains.

Very little has ever been written, and less said, upon the internal administration of this most valuable adjunct to our list of hæmostatics.

The most of us do at times have those perplexing cases of hæmorrhage after extraction which are very hard to control, and necessarily resort to numerous devices to bring about the desired results, all or a portion of which are very disagreeable to both dentist and patent.

Tannic acid, administered internally in proper doses, will stop, I believe, any case of hæmorrhage caused by tooth extraction, in from thirty minutes to one and one-half hours' time. The manner and results of administering this very simple remedy I will illustrate by one case in practice.

I was called, March 25th, 1885, at 8 p. m., to check hæmorrhage from the lower gum of a lady, caused by the removal of eight badly-decayed and broken-down teeth. They were removed while patient was under nitrous oxide

gas, with no more laceration of the gums than generally occurs. Patient did not bleed very profusely at the time, but as she was of a hæmorrhagic diathesis I kept her there until it had entirely ceased, with instructions to call me at once if there was a return of the hæmorrhage to any great extent. As she lived some distance away, and being at home alone, I did not hear from her until about 7 p. m., when her husband came to me with the information that his wife was bleeding to death. I immediately went to their residence and found the patient in a bad state indeed. Pulse was very weak, and she looked about ready to expire, but there was life, and, upon enquiry, I found that she had expectorated nearly one quart of blood. Upon examination I found blood oozing from all portions of the gum. I immediately placed three grains of tannic acid in one third glass of water and gave her two teaspoonfuls every five minutes until she had taken three doses, then two teaspoonfuls every fifteen minutes; after the second dose the flow had diminished to such an extent that I left them with instructions to administer the same amount every half-hour, which they did, and were only obliged to give two doses before it ceased entirely, with no return.

I have used tannic acid for the past five years, whenever occasion presented, with the same good results, in fact it has never failed me.

Now what is its physiological action? From experiments on animals with large doses, it appears that this acid renders the gastric membrane pale and lustreless and coagulates its mucus. Injected into the blood-vessels it coagulates the albumen of the blood. To the former of these actions, as well as to its inherent astringency, must be attributed the dryness and sense of constriction which it produces in the mouth and fauces.

We are told that tannic acid is not absorbed and does not circulate as such, but is converted into gallic acid. It is true that in this form alone it is found in the blood and

urine. Indeed, it could not remain in the blood without coagulating it, as experiments on animals demonstrate; but as gallic acid is not an astringent, it is difficult, while admitting the conversion of the one acid into the other, to explain the therapeutic operation of the latter.

Several theories have been proposed for this purpose, but, as far as I can find, all of them are unsatisfactory.

Lewin has shown that the coagulum of albuminous substances formed by tannic acid, if made slightly neutral, loses its coagulating power. Thus an albuminate of tannin formed in the blood is dissolved again in an excess of that alkaline liquid. A small portion of tannin escapes neutralization and is discharged with the urine unchanged, and hence, according to Lewin, tannin, as such, may exert its power in all parts of the system. It would appear, also, that the hæmostatic and analogous qualities of tannic acid are due not to an action upon the blood, but upon the blood-vessels, by which they become contracted and the flow of blood through them is checked.

We also see in nervous patients frequent anomalies of the vasomotor and trophic functions, but up to the present time we know comparatively little that is certain as to the precise nature of their occurrence.

Physiology distinguishes two varieties of vaso-motor nerves,—the vaso constrictors and the vaso-dilators; but since experiments have detected the latter variety in only a few places, for example, in the chorda tympani, the nervi erigentes, and the sciatic, they have not acquired a very great significance in human pathology. We are at present much more disposed to refer every abnormal constriction of the vessels to an irritation, and every abnormal dilatation of the vessels to a paralysis, of the vaso-constrictor nerves, although perhaps pathological conditions of irritation of the vaso-dilators may not be at all rare. In regard to the precise anatomical course of the vaso-motor nerves, it is necessary to state that vaso-motor irritations may certainly proceed from the cerebrum, as is shown by the well known symptoms of blushing and pallor from mental emotions. In experiments on dogs Eulen-

burg and Landois have succeeded in producing a fall of temperature on the opposite side by irritating certain portions of the cortex in the immediate vicinity of the motor centres, and by extirpation of the same parts they have produced a rise in temperature. It is now known with certainty that there is an important vaso-motor centre in the medulla oblongata, the irritation of which, directly or reflexly, is followed by an almost universal vascular constriction, and its destruction by an almost universal vascular dilatation. We must probably seek the further course of the vaso-motor nerves largely in the lateral columns, from which they pass out chiefly by the anterior roots; but there are also experimental data suggesting the presence of vaso-motor nerves in the posterior roots. It is not known with certainty whether there is any decussation of the vaso-motor fibres, or, if there is, where it occurs. The larger part of the vaso-motor nerves collect, at any rate, in the principal trunks of the sympathetic, from which, as is well known, the separate plexuses that surround the vessels arise. It is probable, however, that there is in part a direct passage of vaso-motor fibres from the cord into the peripheral nerves. There are also ganglia in the walls of the blood-vessels themselves that are capable of maintaining the tone of the circulation in the absence of the central force or influence, but under ordinary conditions these minor ganglia are denominated and controlled by the one central power which unifies the whole system and renders it complete.

But, be it as it may, tannic acid, administered internally in proper doses, does stop the flow of blood from ruptured blood vessels, and is a hæmostatic that I wish to commend to the careful consideration of all, for by looking deeper into this subject we shall all be benefited and perhaps add one more drug to our list.—*International Dental Journal.*

Editorial, Etc.

ANTIQUITY OF DENTISTRY.—Dr. Talmage in a recent sermon remarks: "Dentistry, that we suppose one of the important arts discovered in recent centuries, is proven to be four thousand years old by the filled teeth of the mummies in the museums at Cairo, Egypt, and artificial teeth on gold plates found by Belzoni in the tombs of departed nations. We have been taught that Harvey discovered the circulation of the blood so late as the Seventeenth century. Oh, no! Solomon announces it in Ecclesiastes, where, first having shown that he understood the spinal cord, silver colored as it is, and that it relaxes in old age, "the silver cord be loosed," goes on to compare the heart to a pitcher at a well, for the three canals of the heart do receive the blood like a pitcher, 'or the pitcher be broken at the fountain.'

"What is that but the circulation of the blood found out twenty-six hundred years before Harvey was born? After many centuries of expl· ration and calculation astronomy finds out that the world is round. Why, Isaiah knew it was round thousands of years before, when in the Bible he said, 'The Lord sitteth upon the circle of the earth.' Scientists toiled on for centuries and found out refraction or that the rays of light when touching the earth were not straight but bent or curved. Why, Job knew that when ages before in the Bible he wrote of the light, 'It is turned as clay to the seal."

A CAUSE OF DENTAL CARIES.—A Chicago dentist attributes the wide-spread decay of teeth in America to too much kissing. Such an outrageous theory is sufficient to produce hysterics in prim and proper spinsters, who would be unspeakably horrified if any one supposed their dental defects were due to such a cause.

Bibliographical.

A TREATISE ON THE IRREGULARITY OF THE TEETH AND THEIR CORRECTION, including, with the author's practice, other methods. By John Nutting Farrar, M. D., D. D. S., volume 1st, New York City, 1888. The first volume of this extensive work of Dr. Farrar has made its appearance, and has fully and completely met the anticipations of all those who were cognizant of its preparation. There is no other work on the subject that in any manner equals or excels this great treatise. The author in his preface remarks: "I have aimed to make my views especially clear, not only to correct current erroneous impressions, but also to place the results of my experience before the profession to whose welfare and progress I have striven to contribute during the best years of my life.

"When I began to practice, principles, methods, and even suggestions in regard to regulating teeth were meagre. The apparatus in use was crude, clumsy, uncleanly, and painful. Invention, to me, has always been a diversion, not a labor, therefore I found enjoyment in this occupation; and when I succeeded in making, among various instruments, devices that seemed to be an improvement on the established forms of regulating apparatus, I thought it no more than right to describe them for the benefit of others." In the first chapter the author also remarks: "The importance of the observance of the physiological law which governs tissues during a movement of the teeth (by means of art), the object being to prevent pain, to insure this result the pressure by which the movement is to be effected should be under the control of the patient, a requirement which implies the use of instruments capable of being operated and adjusted at will."

For convenience, the work is divided into three volumes (the two additional volumes soon to follow the first,) and, not including those of the third volume, will be illustrated with nearly 2,000 engravings.

The first volume relates to the history and etiology of Irregularity: The Basal Principles of Regulation; Nomenclature;

Principle of Construction of Apparatus; Retaining Devices; Laboratory Rules for Manufacturing Devices; Application of Force; Eruption; Antagonism; Interdental Spaces; Correction of Irregularities by Grinding, and by Extraction.

The second volume contains the Classification of Irregularities, and the Various Methods of Treatment for Correction; Straightening Teeth to Line; Turning and Elevating Teeth; Widening and Enlarging the Dental Arch; Correction of Protruding Teeth; Miscellaneous Suggestions, Practical and Theoretical; and lastly, Æsthetics of Dentistry. . . . The third volume is wholly pictorial, being an object index of all mechanisms described in the other volumes.

The third volume refers to "History", and quotes the labors of Dr. Van Marter, of Rome, on the work of the Etruscans, a race which preceded the Romans; also extracts from Dr. H. Eames' "Russian Antiquities," with illustrations and descriptions of instruments from Pompeii, made during a visit to the Museum at Naples. It also contains the "History of the Use of the Screw" in regulating teeth.

The third part of this volume refers to many interesting subjects, among others, The Influences of Evolution upon the Jaws; Premature Extraction of Deciduous Teeth; Power of Heredity· Influences of Insanity and Idiocy upon the Teeth.

"Upon the Question of Hetezogeneousness in the Mixture of Races," the author concludes that "there is an underlying power, a law that tends to evolve order out of confusion, not only in mental but also in bodily forms. If study of this law should find a place in the science of dentistry, it would contribute to an education that would lead to broader views." In this third part the "Philosophy of the Author's System," is given in a manner that reveals the basis of the work. 1. That in regulating teeth the force should not exceed the bounds of physiological functions. 2. That the plan of moving teeth by elastic materials, though practical, if kept under perfect control, is so difficult to manage that it often leads to pain and inflammation, and is sometimes dangerous to the future usefulness of the teeth, while a properly-constructed apparatus, intelligently operated by means of screws, insures beneficial results without pain or nervous exhaustion. 3. That if teeth

are moved by absorption through the alveolar process about 1-240 of an inch every morning, and the same distance in the evening, no pain or nervous exhaustion follows. 4. That while these tissues will allow an advance of a single tooth at this rate (1-240 of an inch)twice in twenty-four hours without exceeding physiological functions, if a much greater pressure be made the changes will become pathological.

All of which renders this great work one of the most valuable additions of the present age to dental literature.

THE PHYSICIANS' VISITING LIST for 1891. P. Blakiston, Son & Co., Publishers, Philadelphia. This valuable visiting list has reached the fortieth year of its publication. It consists of Regular Interleaves, and Perpetual Editions. Its contents comprises Almanac; Table of Signs; Marshall Hall's ready method in Asphyxia; Poisons and Antidotes; Metric or French Decimal System of Weights and Measures; Dose Table, List of New Remedies; Aids to Diagnosis and Treatment of Diseases; Diagram of Eruption of Deciduous Teeth, Posological Table; Disinfectants; Examination of Urine; Incompatibility; New Table for Calculating the period of Utero-gestation; Sylvester's Method of Resuscitation; Transportation of Injured Persons and Diagram of the Chest; all of which render it a most useful and convenient list. It also proves a valuable and convenient appointment list for the dental practitioner.

THE MEDICAL BULLETIN VISITING LIST OR PHYSICIAN'S CALL RECORD.—Arranged upon an original and convenient monthly and weekly plan for the daily recording of professional visits. F. A. Davis, Publisher, Phila., 1891.

The Visiting List contains a Calendar for the last six months of 1890, all of 1891 and 1892; Table of Signs to be used in Keeping Accounts; Table of Fees, Dr. Ely's Obstetrical Table; Tables for Calculating the Number of Doses in a given R, etc, etc.; for Converting Apothecaries' Weights and Measures into Grammes; Metrical Avoirdupois and Apothecaries' Weights; Number of Drops in a Fluidrachm; Graduated

Doses for Children; Graduated Table for Administering Laudanum; Periods of Eruption of the Teeth; The Average Frequency of the Pulse at Different Ages in Health; Formulæ and Doses of Hypodermic Medication; Use of the Hypodermic Syringe; Formulæ and Doses of Medicines for Inhalation; Formulæ for Suppositories for the Rectum; The Use of the Thermometer in Disease; Poisons and their Antidotes; Treatment of Asphyxia; Anti-Emetic Remedies; Nasal Douches; Eye washes, etc., etc. It is published in three styles according to the number of pages and blanks for recording visits.

Monthly Summary.

ART AND DENTISTRY.—A good dentist should, indeed, be a man of great refinement, of artistic conception, with a true sense of the proportion of things, and of the harmony of colors. We have only to look at the teeth people often wear to notice that this is not very often the case. It must be remembered that in nature there is a great beauty in the irregularities, in what is often called the ugliness of shape and color. Because an even row of very white teeth is the ideal, this does not prove that such teeth suit everybody. What can be more ghastly than an old, decrepit personage, with a bad complexion, who sports a double row of splendid white teeth? What is more ridiculous than one white, spotless artificial tooth standing in the midst of yellow and partially decayed real teeth? Or, again, what a lop-sided effect is produced if teeth on one side of the mouth grow irregularly, while, on the other side, artificial teeth have been fixed up in regimental order. Yet how few people are there who, having artificial teeth, have the good sense to ask that those teeth should be just as imperfect in shape, position and color as the real teeth were they are destined to replace?

If we have not ideal teeth, the probabilities are that there are many other things in feature and complexion which also are far from being ideal. And the introduction of one or more ideal teeth, where the surroundings are anything but ideal, is

no improvement. It creates a discordant note, destroys the harmony which prevails even in ugliness, and renders that ugliness more evident and more unpleasant. But it requires a high conception of true art to thoroughly appreciate these principles and apply them successfully in practice. It is, therefore, not surprising to find that distinguished dentists are the constant and appreciated friends of men of art and of letters.—*Dental Advertiser.*

LATER OPINIONS ON THE VALUE OF KOCH'S DISCOVERY.—Professor Virchow defends Professor Koch against the charge of prematurely publishing his discovery. Professor Koch, he says, only consented to the disclosures already made at the request of Minister von Gossler and several of his medical colleagues, Doctors Virchow, Levy and Bergmann. Everyone in Professor Koch's confidence supports his protest against the sensational expectations regarding the results of the remedy. Professor Stellwag, of the Vienna University, addressing the students, advised them to be cautious in expectance, believing only what Professor Koch has directly stated. "So far," added Professor Stellwag, "the possibility of the cure of lupus alone has been proved, while it has not been scientifically established that lupus arises from the same bacillus that is associated with lung tubercles. Dr. Ullmann writes: "It will take fully a year of frequent injections, besides treatment under right sanitary conditions, to enable one to form a reliable opinion as to the curability of consumption, either in advanced or in early stages." Doctor Ullmann worked for several months in Professor Koch's laboratory. He believes the remedy promises good results in cases of external tuberculosis, although, he says, relapses must be guarded against. Doctor Surycki, reporting to the Medical Society of Cracow, which sent him to Berlin to investigate, declares that even the cure of external tuberculosis by the new process is uncertain, while he sees no grounds for believing that it will cure consumption in any stage. Doctor Kraus, of Vienna, affrms the benefit of the remedy for tuberculosis of the bones, skin, and joints, but does not believe that it will ever heal lung tuber-

cles. Doctor Kraus was in attendance in Berlin for several weeks, testing the experiments. Professors Fraenzel and Runkuritz, in their latest report, confirm the opinion that the injections do not materially check advanced phthisis. They do, however, arrest early phthisis, but the bacilli may revive and reinfect the tissues. The opinions of a number of other experts—German, Austrian, and English—all of the same tenor, are becoming known, and tone down the excited public expectations.—*Med. Record.*

RETAINING POINTS.—Nowadays it is the fashion to declaim against retaining points for cavities in which gold is to be inserted. Never was there a greater fallacy. Take the simplest contour filling, which may be one in an incisor tooth with a living pulp, and it goes without saying that the first pieces of gold should be securely fastened to a given point or points to insure non-tipping. Be the cavity ever so well prepared for retention of gold, a point or two in the thicker portions of the labial or palatal wall and one near the cutting edge, or at least a properly shaped groove, is indispensable for the prevention of leakage into the cavity. Other cavities in living teeth call for the use of retaining points—not in the direction of the pulp—for the pinning of gold to the abraded ends of the teeth. Many times pulpless teeth are rendered more useful by the drilling of retaining pits in the proper direction, saving strength of tooth structure and avoiding the loss of profile walls whose cutting away would disfigure the countenance, by restoration with gold. Operations on the teeth with gold under the most favorable circumstances are transitory instead of permanent, and it were death to estheticism to avoid the use of pits or points as an aid to perfection of mechanical impaction of gold to prevent unsightly discoloration, in order to say that all cavities should be prepared in a manner that renders unnecessary the boring or drilling of pits, or points which will permit of the pinning of gold to a cavity. Selah!—*Dental Review.*

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ARTICLE I.

THE TREATMENT OF PROXIMATE CAVITIES.

BY GEORGE HOWE WINKLER, M. D., D. D. S.

[Read before the New York Odontological Society, Oct. 21, 1890.]

In offering this paper upon the subject of the treatment of proximate surfaces of teeth before the Odontological Society, I fully comprehend that the fundamental principles therein contained are so thoroughly understood that I can only hope to excite interest by confining myself almost entirely to the details of my own methods, and in doing so I shall be as concise as possible. In the formation of proximal cavities in the incisors and cuspids, I generally conform to a plan somewhat similar to that advocated by Dr. Arthur, of forming V-shaped or self-cleansing spaces by cutting away the posterior proximal surfaces of the teeth to be operated upon and inserting what Dr. George S. Allan, in his recent paper upon this subject, named "face-fillings." Slight grooves should be made in the cervical walls, and slight under-cuts opposite where these

cavities do not encroach upon or involve the cutting edges, in which cases the under-cuts should be made along the incisive edges, the front plate of enamel being left intact. This is my rule, and, while I deviate from it at times, owing to the exigencies of special cases, I consider it the best means of protecting these teeth for long periods of time from further decay. None of the objections urged to the cutting away of molars or bicuspids in Arthur's method apply here, and by following this plan a display of gold is avoided, which is disfiguring, and the duty of that avoidance is in my estimation second only to the duty devolving in the preservation of the teeth themselves. Naturally, if a tooth is broken away, I restore the contour by building up with gold, or adjust a porcelain crown. I am a staunch advocate of preserving or restoring the contour of bicuspids and molars; in simple cavities, where space offers, filling flush with the tooth; in others where decay has destroyed the grinding surface, or it is necessary to approach a cavity by cutting away sound tooth-substance, the contour should invariably be restored. It is better that the filling should be top-heavy rather than provided with insufficient material. In that case the anchorage is extended more completely over the grinding surface, as is advocated by Dr. Parmly Brown. Usually it is better in proximate teeth to enter the carious cavity by cutting through the grinding surface; but in cases where decay has taken place near the gingival margins, with a strong body of enamel and dentine between it and the grinding surface, it is often advisable to drill into the decay through the buccal surface, running a tunnell, as it were, along the approximal, parallel with the decay, and so reach and arrest it. In the preparation of cavities the line of cleavage should generally be followed as nearly as possible, the edges of the cavity being very slightly rounded so as to allow the filling to flap over them rather than the reverse. Retaining pits should never be used in these locations, nor, in fact, in any others except where cast fillings are employed.

They are unnecessary in my method of operating. In their place slight grooves should be made in the cervical wall which cuts off the nutriment from so thin a layer of dentine and enamel rods that the overlapping filling at the bevelled edge of the cavity covers and protects a large proportion of them. Strong anchorage should be secured across the crowns, where the filling is made through the grinding surface, and slight under-cuts above and below where drifts are sent in from the buccal sides of the teeth. I fill all simple proximal cavities except in rare cases with non-cohesive foil, and never begin a contour filling with cohesive gold. Whenever it is necessary to contour a tooth, non-cohesive foil should be packed against the cervical wall, and the proximal cavity should be filled with it to within about a line of the grinding surface, where the palatine or lingual and buccal walls are intact, and as far as possible where one or both of these walls may be wanting. Cohesive foil is then welded to the already thoroughly condensed mass and the contour and grinding surface restored. In very soft bicuspids and molars, or where the cavity of decay has somewhat encroached upon the pulp, tin-foil should be used in place of non-cohesive gold. In lower molars, where the destruction of tooth-substance has extended quite to or a little beneath the gum, it is frequently advantageous to fill the cavity partly up with copper amalgam and at a subsequent sitting to finish and polish this filling and then contour the tooth with gold. Dr. Gordon White, in the past year, has introduced copper foil for plugging against the cervical walls, and asserts, "It does not look pretty, but it saves the teeth." In contouring upper teeth I never use the rubber dam, because in my method of operating it is not needed, instead of which I use separators, wedges, matrices of various forms, and napkins, which I change during the operation as they dampen. In the treatment of proximate surfaces, where the progress of decay has nearly or quite exposed the pulp, it should be immediately extirpated, the roots filled, and the

crown proceeded with as before. In the case of young persons, where the functions of the pulp have not been fulfilled, I cap each pulp with a mat of tin-foil and insert temporary fillings, which are frequently examined and renewed when necessary. In time, the patient having arrived at proper age, the temporary fillings may be replaced by permanent ones, the tin mats being still retained, or the pulps may be extirpated. To one who has never operated with tin-foil, or non-cohesive gold-foil in combination with cohesive, it would be impossible to satisfactorily explain the great value of this method. At least two-thirds of each cavity can be filled with the greatest facility and in the shortest time. The danger of bruising or crumbling the walls is avoided by the presence always of a comparatively thick pad of gold between the plugger and the fragile tooth. The tooth is relieved of the long-continued malleting required in an all-cohesive foil filling, both patient and operator are saved great fatigue, and, in the case of the former, sometimes utter exhaustion. A most perfect hermetic sealing of the cavity is also secured, and a surface for the final finishing is presented sufficiently durable for all practical purposes, and yet soft enough to enable the operator to readily make a perfect finish at the cervical wall. There is no danger of small flake-like particles overlapping the surface of the tooth beyond the filling and probably causing a renewal of decay. A remarkable strength of union is obtained between these foils by beginning the cohesive-foil work upon the thoroughly condensed non-cohesive with small pieces of gold hot from the lamp. Each piece of gold then is freshly annealed as used, and every instrument is warmed to drive off the condensed moisture of the air. The instruments with which I pack gold are all smooth. In plugging with non-cohesive foil I work on the mechanical principle of a dovetailed mortice, and with cohesive foil I depend entirely upon its property of cohesion; never, under any circumstances, either depending upon or desiring the inter-

digitations made by serrated or sharp-pointed instruments.

Such, gentlemen, is a brief statement of my method of treatment of proximal surfaces, and while I am aware that the tenets I hold are opposed by many of our profession, I believe them to be the best. Non-cohesive and cohesive foil operations are distinct arts, both of which are beautiful in their perfection, but the intelligent combination of them must, in my opinion, ever remain more valuable than either. There exists in our profession, as in other medical specialties, a certain amount of scepticism in the presence of propositions which are contrary to pet theories and tried practices, and I expect that at least some portions of the above creed will be opposed with vigor. With thanks, gentlemen, for your kind attention, I have finished.—*International Dental Journal.*

ARTICLE II.

TREATMENT OF THE THIRD STAGE OF ALVEOLAR ABSCESS.

BY E. C. MOORE, D. D. S., DETROIT, MICH.

[Read before the Michigan State Dental Society, 1890.]

I am of the opinion that in almost every case of alveolar abscess the happiest results may be attained without the application of medicine, unless we may construe water as coming under that head. Although the writer generally uses some antiseptic or disinfectant, or, in the language of Dr. George Watt, "a stink disguiser," or germ destroyer,—this not so much as an element in the curative process, as for the comfort and pacification of his olfactories,—the treatment consists chiefly in removing the cause or source of this outflowing fountain, the putrescing nerve or

pulp, just exactly as one would remove from the alley a dead and decomposing cat or dog if in too close proximity to his residence. It is of little consequence how this is accomplished, so that it is effectually accomplished—the source removed, eradicated; just a little fresh dirt thrown over the defunct animal may change the character of the air wafted through the family residence for a time, but as the elements of combustion, sun and air or heat and air, again reach the dead flesh, the product of decomposition is made manifest. Just so in the treatment of the nerve canal, the dead cat must not only be thoroughly removed, but a barrier placed against its possible return, and, so to speak, the alley closed up. This dead matter, animal or vegetable, must be removed, and in its stead a filling of almost any indestructible substance must thoroughly seal the apex of the root at least. Now, in the removal of this matter, and in the process of preparation for filling, there is one infallible remedy or preventive which I am going to disclose to you as a great secret, (and if it should be the only recommendation in this paper heeded, the writer is content,) and which, if you will use, can not fail to prevent trouble. We often hear practitioners speak of sure cures, or specifics for certain troubles, which we are apt to take with at least a grain of allowance; but I tell you I have a sure cure or preventive, and I can demonstrate to a certainty its infallibility, and that is a preventive of going through the side of the root in the process of cleansing or preparing for filling. Never, never, never use a drill in this connection; it is useless, it is unnecessary, it is bad, it is senseless, it is unpardonable, it is criminal, and should be a State prison offense, so inexcusable is it. If this precaution or preventive is acted upon, it is simply impossible to puncture the periosteum, unless there is an opening already there, for which you can in no way be responsible, and here is the strong point in favor of this advice. If you do not use the drill, you cannot be held or made responsible for any openings through the root. You are satisfied in your own

conscience that you have not at any point gone through the side or bottom. With the excellent quality of broaches and canal cleaners, particularly the Donaldson, there is no excuse, and no guilty man should escape.

As I have already intimated in this short paper, it is of little consequence what the canal is filled with so long as the substance is indestructible in the mouth; but both the cleansing and the filling must be thorough—be sure of this. And to do all this it is unnecessary to wait a minute for farther treatment than has already been described in this paper. The permanent filling, so far as the canal is concerned, can be put in at once, and there is the end of it, leaving the rest to the tender mercies of dame nature, who only mixes a little time with her remedies.

For a filling material the writer prefers tin or oxychloride of zinc, the former being used in the straight, or single canaled teeth, and is prepared from a light number of foil by shaving off with a sharp pair of foil shears into hair-like strips. One end of one of these hair-like strips is placed at the orifice of the canal to be filled, and with a fine, smooth broach reduced to this fineness and smoothness by a fine oil stone, and with the same squared across the end, the foil is caught by this squared-end broach and carried to the extreme end of the canal, and by a slight backward and forward motion the rest of the strip is tucked in and made quite compact. This operation is repeated to the satisfaction of the operator, and in receding from the apex of the canal, and as it grows larger, larger instruments are used. It is not the intention of the writer to enter too much into minutiæ. All this is worked out by the operator himself.

Oxychloride of zinc is used in a class or kind of root filling where the canal is very small or difficult of access, or the canal can only be entered by using a curved instrument. A very fine broach, prepared as above described, only smaller, is used to work this cream-like mixture of oxychloride of zinc into the finest canals. A small amount

of the mixture is placed at the orifice and the line broach punctures it and passes on to the extreme end of the canal, and then a slight motion of the instrument will cause the thin mixture to disappear into the canal, removing the instrument occasionally to expel the air from the canal, to allow the oxychloride to take its place. This is preferable, in the writer's estimation, to a solution of gutta-percha and chloroform; it is more liquid-like and does not stiffen like the gutta-percha, owing to the rapid evaporation of the chloroform.

After this short description, passing around some of these small instruments will give you a better idea how this kind of root filling is done, and how the little instruments are prepared.—*Ohio Journal of Dental Science.*

ARTICLE III.

THE TREATMENT OF PROXIMATE SURFACES.

BY GEORGE A. WILSON, D. D. S.

(Read before the New York Odontological Society, Oct. 21, 1890.)

To many of you it may seem presumptuous in me to attempt to offer a single new thought on the subject I have chosen for my paper this evening.

While I cannot hope and do not undertake to add much to what is known, I still think it is not too late to make it interesting.

Repetitions may therefore be pardonable if we review some of the laws that govern these operations and endeavor to see if they are understood and complied with.

I suppose it is because I so love the work and have lived in it so long that the question has become one of first importance. It is because I believe that to every conscientious worker it is a theme of ever-recurring interest; it

is one which never fails to appeal to our best judgment and challenges our finest skill; it is one whereon the most proficient among us welcomes more light and knowledge in methods of treatment and the establishment of correct principles of practice.

To this end—viz., the firmer establishment of principles and ideal methods, and thoroughly practical as well —I would engage your thoughts this evening, for I believe the time has come when we should no longer be primarily seekers after the best ways of practice, but proficient workers on principles which are concurrent and co existing with accepted truth and law.

The correct treatment of proximate surfaces in teeth brings us face to face with a very complex problem, but, like all much-mixed equations, we must first reduce it to a simple one.

In considering this matter I must perforce do so from a stand-point which twenty-years' experience has proved to me to be the correct one.

Beginning as a disciple of contour work in the office of my honored preceptor, Dr. Atkinson, and having the advantages of the experience of such brilliant operators as Varney, Palmer, and Webb to aid me in my first researches after the best way, it is no wonder that I then and there espoused the newer system to which I have ever since given my unwavering allegiance. In fact, I may well consider myself fortunate in coming on to the stage of action just at that time and under so favorable circumstances, and perhaps do not deserve as much credit for steadfastness as many others whose chances, as students, were hedged in by meagre and, in many cases, adverse opportunities.

Aside from the fact that my whole professional life has been singly devoted to the development of this newer system, I have no plea to offer in support or defence of contour work as the correct principle. At this time it needs none. We are workers on accepted and well-grounded principles, having passed that time when theory and argu-

ment preceded and often defeated intelligent effort. The voice and work of the majority of the best men in the profession make a plea more convincing and eloquent than a Varney or a Webb could offer were they among us.

Were reasons asked by young men entering the profession why they should adopt this better way, first among them would be, it is in support of nature's plan: this plan, as manifest throughout the animal world, so far as the shaping and building of teeth is concerned,—leaving out that subsequent factor, decay,—is not to be questioned or improved upon. Their arrangement and adaptation for the work designed for them to do is as perfect as divine wisdom could make it.

Another reason is the inconsistency and futility of arraying our skill against the ravages of decay while we array ourselves against nature as well.

Decay and the causes of decay, perhaps arising from serious infringement of the laws underlying the preservation and integrity of the teeth, come in, and here our work begins. The charm and fascination of feeling that everything one can do to prevent, arrest, and redeem the teeth from the ravages of decay and aid nature in restoring and sustaining her ideals may ever be counted upon as a most potent aid and inspiration. To feel one's self able to give back to suffering fellow-mortals what decay has robbed them of—comfort, consciousness of a wholeness and restoration of first forms and first unconsciousness of loss and pain—is certainly a high moral incentive for every dentist, young or old, to consider.

Hitherto, it seems to me that the contour system of filling teeth has been discussed far too much from the stand-point of restoration, while the equally important principle of prevention and the establishment of conditions which render subsequent attacks of decay far less liable to occur has been overlooked.

Claims for superiority in this particular over the old system have not been urged and maintained by our best

writers on this subject as persistently or as justly as they have a right to do. Very many of the principles involved in a perfected system of dentistry, as applied to the natural teeth, have been but lightly touched upon. Obliteration of interproximate spaces, deranged occlusion, perfect lines of axis of the teeth, preservation of the perfect arch and consequent freedom from pressure on tissue around the teeth, —these are all matters which have received far less attention than the contour filling itself. Against this the bolts of the opposition have mainly been shot. The old system was open to all these dangers and invited them; the new anticipated and prevented them.

The fatality of making spaces between the teeth, as a rule of practice, is seen and known, and the practice, as Dr. Black tells us, has passed into practical oblivion among almost all of the best men in the profession. It is, and always was, an indulgence in easy and crude methods fraught, as every honest man knows, with a train of evils which he does not care to have brought to his door. Earnestness—even enthusiasm—in this matter need not constitute a plea for superiority, but rather looks to execution more perfect and methods reduced to harmony with natural and mechanical laws, better suited to cope with ever-varying conditions which make our work necessary.

Just here let me say that I am pleading for the adoption of better rules of practice, not speaking of individual and particular cases. I would not be understood as saying that strict contour work was in every case practical or feasible. Limitations and environments of many kinds render this impossible in certain cases. I refer to that class of cases which invites the exercise of our best skill and puts no restrictions thereon. It is in this domain that I would seek to establish the highest standards.

Referring to recent literature on this subject, and notably the papers of Professor Black, Drs. Jack and Perry, we have the subject handled in a most masterly

way. Dr. Perry, especially in his treating of the matter published in the *International Dental Journal* of last year, evidently meant that there should not be anything left to be said. Certainly he has given us with charming candor —peculiar alone to him—the "logic" of his varied experience. No more cogent or conclusive argument need be asked for—were such a defense necessary—in support of the contour principle. First an enthusiastic contourist, then a lapse into the middle ages, a "dark period" of doubt and distress, but finally to emerge again into the light, one of the ablest exponents, both by word and deed, of the better way.

At the last anniversary of the First District Society of this city a paper was read by Dr. Allan, of this Society, and discussed by the representative men there present. As many of you may remember, that discussion was a very one-sided one and constituted as eloquent a plea as possible for the superiority of the new over the old system, theories, and methods. Dr. Allan, in starting, said, "The bulk of the practice of the day is in the direction of face-fillings; the theory of the day is contour fillings." Had this sentiment been uttered twenty-five years ago it would have better fitted the times. The sentiment expressed in that discussion showed most conclusively that the profession had outgrown those crude and gruesome methods. As Dr. Allan promises to be heard from again (and certainly needs to be, to set himself right) on this subject, I refrain from further criticism.

Referring to some mechanical principles which have aided me greatly in reproducing contour, I must go back and criticise Dr. Perry a little. I can find no mention in his paper of a principle that gold could be so inserted in a tooth as to strengthen the walls rather than weaken them.

Hitherto, those who have opposed this method have agreed that contour work weakened the teeth. I allow that in certain cases it may, but as a rule it need not, but,

on the contrary, it can be so done as to strengthen and hold together very frail walls, relieving them of all strain, while the gold takes the wear and work. We may call it the bevel-edge principle.

Then Dr. Perry conveys the idea that enamel has great strength as seen in the "enamel rim," "the great arch," "the coronal arch," etc.; he would spare it, trust it to do what nature, in my judgment, never intended it to do. His argument here is, I think, misleading.

There is great strength and resisting power in enamel only when force is applied to it endwise. Nature so arranged those rods on teeth that from any direction assaults of an enemy were met endwise; reverse this law and flank it, attack it from its side, and it splits as easily as matchwood. Hence I say, as a careful principle, never trust enamel to hold gold or other metal; cut till you get anchorage into material which is built on a different plan and has holding power and strength; dentine, Dr. Perry's "great arch," as I understand it, forms the bridge over cavities in proximate surfaces where decay has not proceeded far enough to warrant cutting through from the grinding surfaces.

This class of fillings, where this arch was left, have, with me, been more productive of failures than larger ones where it was cut away. I have found that this bridge of enamel would give way sooner or later, and I would have to do what I should have done at first,—cut through from the grinding surface and into the fissure as well, perhaps.

Dr. Perry also tells us that "enamel does not coalesce in the fissures." How, then, can it be of much service in binding the cusps together? The dovetail or opposing-point principle in shaping cavities to hold gold rather than retaining pits,—anchorage into dentine,—and, when practical or necessary for future strength, bringing the gold over into the fissures and grinding surface, forming a knee-shaped filling which relieves the proximate walls of all strain, and bevelling these edges to prevent their escape—

as the jeweller his diamond,—are some of the principles upon which contour work can be successfully done.

There is another important thing to consider in beginning and ending an operation of the proximo-contour character, and that is, first, to note the conditions and positions of those parts of teeth affected by caries; and, last, that when the work is completed a new set of conditions is established, new relations of the parts subject to decay, and free margins which can be examined easily and quickly.

If enamel must be left at the cervical border, trim it smoothly, slightly round or bevel the edge, and place and pack the first pieces of soft gold with hand pressure. No malleting is allowed here until a thickness of gold sufficient to protect the thin rim of enamel from fracture by the mallet is secured.

Dr. Perry speaks of the "matrix" as an adjunct to perfect contour filling, but, as I am pleased to see, with evident misgiving.

Does the artist need a stencil-plate for his beautiful fresco and decoration? the sculptor a mould into which to press his clay for a model of the form which is to follow? No. The true artist who rebuilds and restores the forms of teeth needs only the trained eye and skilled hand.

There is one prime necessity,—a dentist should be born such. As Oliver Wendell Holmes would tell us, he must have the cumulative qualities of four generations of mechanics concentrated within himself, and out of this wealth of endowment he can formulate a code of dental mechanics without great study or need of imitation. The true artist does not depend on the work of others for his models or inspirations. He may use appliances and methods in pursuing his work which others have found to be good, but he accepts their use because they fall in line and come within the scope of his own work.

In conclusion, let me say just a word in honor of the men who, for half a century or more, have lived in the light and helped others to grow towards the sunshine, and

who honor us with their presence to-night,—Dr. Atkinson and Dwinelle.

As Dr. Perry has so eloquently put it, let us all congratulate them that they have lived not only to see the "irresistible tide of ripened professional judgment" setting in their direction, but rising and swelling about them and bearing them on with ever-increasing honors to and beyond the end of their earthly career.

Let us be proud of and enjoy them while we may, as our beloved masters and teachers, workers ever and always in establishing the highest standards, and never content until attained. Well may they be proud for their part in building up a system of dentistry, which, "built upon the needs of human kind, will endure while those needs last." —*International Dental Journal.*

ARTICLE IV.

OLDEN-TIME ARTIFICIAL TEETH.

A curious old book has just come into our hands, kindly lent by Mr. Rutterford, which already in the year 1816 had reached its fifth edition. It is entitled "A Dissertation on Artificial Teeth," by M. de Chemant. Apparently its object was to act as a kind of advertisement for M. De Chémant, since his address is printed in a very prominent manner; indeed, he devotes a page to informing those persons who may desire to consult him on the subject of his mineral paste teeth, that he would be obliged to them if they would, on the preceding day, making their appointment, etc., etc.—We fancy it would be a case of the "pot calling the kettle black," were we, of this generation, to find fault with this comely old gentleman (his portrait is given) for so doing. Unfortunately, it is now-a days more the rule than the exception for those who rush into

print, to let their address occupy a prominent position in the book, though perhaps they do not so openly (should we say honestly?) let the real why and wherefore of the book's appearance be seen.

The chief point of interest in the book centres in a sheet of engravings illustrating the various types of dentures which M. De Chemant was prepared to supply to his patients. Here is a porcelain bridge of ten teeth supported by four pivots by which they are fastened to the stumps remaining in the jaw. A single tooth for all the world like a Logan Crown. A single tooth to be fixed by means of a small plate of gold, or, as we in this inventive (sic) age would say, a bridge for one tooth. A row of teeth to be supported by ligatures; this idea we would suggest to some of those inventive genii, who are hard up for something to patent. We do not for a moment wish to detract from the merit due to those who work out original ideas, because some one else has done it all before. But does it not seem a waste of energy? Whether the fact be due to lack of reading on the part of the re-inventor or to our librarians letting their collection of books be but a miscellaneous heap of curiosities, not a classified collection with a general index and guide, we do not know. We remember reading somewhere, that in one of the German Universities there is a general index to the whole library, from which a man can see at a glance what has been done in each branch of study, so that it is possible to continue a line of research from the point where the last man left off, without wasting time going over the old ground.

Very interesting it is to be brought once again in contact with the famous medical men of the beginning of the century. Here we meet John Hunter, who introduces De Chemant to one of his patients, and these six cases of transplantation, followed by "venereal disease" which led him to give up "this cruel practice," are mentioned. Here again, too, the "immortal Jenner," in whose presence and for one of whose patients he removed fifteen or seventeen

stumps, decayed even unto the socket. Here, too, Sir Walter Farquhar, M. Vicq D'Azyr and others.

M. De Chemant speake of these teeth as his invention, and thus records the circumstances, "to satisfy the curiosity of the reader":

In 1788, when I exercised the profession of a surgeon, I was consulted by a lady who had fallen into such a state of weakness as produced considerable fears of her life. On approaching her I perceived a tainted odor, which I thought proceeded from her lungs or her teeth, which were black. I examined her mouth, and was struck with the bad state of a set of human teeth implanted on a base of the tooth of the hippopotamus. This set of teeth being removed, I perceived her mouth to be almost entirely covered with small ulcers, and I had no doubt but that her disease was the effect of the putrid exhalations which proceeded from the set of teeth, and which corrupted the air she breathed; what confirmed this conjecture was that, after having laid these teeth aside, her health improved in a few days. Perceiving that this lady would not do without artificial teeth, I advised her to have several sets of teeth at the same time, so that she might change them often, after having washed them and let them dry. She did so, and her health became perfectly re-established in the course of some months.

"But as teeth of this kind require to be renewed frequently, they occasion a very great expense, and even, notwithstanding their frequent renewal, they always produce a bad smell. I was induced from that time to reflect on the possibility and the means of making teeth and sets of teeth of durable and incorruptible materials. I examined almost all the substances of the mineral kingdom, and at length composed a paste, which, when it is baked, has every desirable advantage."

Now, as a matter of fact, or rather, according to Piggot's "Dental Chemistry," they were discovered by an apothecary of St. Germain, Duchateau by name. He

wore artificial dentures of ivory and natural teeth, but found they rapidly became tainted by the various disagreeable odors emanating from his wares, the porous animal substances becoming rapidly impregnated by the effluvia. Mr. Guerard undertook the manufacture in 1776. Sets were made for various distinguished personages, but he failed from want of knowledge in the practical duties of a dentist. In 1788, Dubois Chemant bought the right, and managed to attract the attention of the French Academy, who appointed a sub-committee to examine the teeth. This committee found various imperfections in the teeth, a fact which, by-the-by, M. de Chemant does *not* record in his book, and one of its members, Dubois Foucou, improved them very much. Practically, little alteration has been made in this substance even in modern times.—*British Journal of Dental Science.*

ARTICLE V.

THE APPLICATION OF MASSAGE IN THE TREATMENT OF DENTAL PATHOLOGICAL CONDITIONS.

BY W. F. REHFUSS, D. D. S.

The utilization of massage in the treatment of various dental pathological conditions, is founded on its successful application, in general and special branches of medicine. In dentistry, alone, its therapeutic qualities have not been recognized; perhaps, because of the numerous difficulties that confront the dentist in the massage of the mucous membrane of the human mouth; the area being small in comparison with the leg or arm where the manipulations are easily performed. When in addition, we consider that the mucous membrane is more delicate than the epidermis

of the leg or arm, it is evident that the dentist must exercise greater skill, and care in manipulating.

The term massage is applied to a series of systematic manipulations, which are best accomplished with the hands, such as kneading, friction, rolling or percussion of the external tissues of the body, the aim of which is to invigorate or restore to a healthy condition parts that may have become diseased or have lost their natural function.

The origin of massage can be traced almost to the Creation; as it was the first means resorted to by mankind for the relief of suffering. This is obvious, because almost every one instinctively seizes a part which is the seat of a sudden pain, and by rubbing or pressing endeavors to soothe it.

To the genius of Peter Henrik Link, of Sweden, credit is due for having instituted and placed upon a scientific basis, what are well known as the "Swedish movement cures." In 1813 the Royal Central Institution was established at Stockholm, with the patronage of the Swedish Government, that Link might practice and teach his system of gymnastics.

In France the country which gave massage its name and greatest impulses, this method of treatment has become neglected. The Germans and Scandinavians, however, have studied and practiced massage, with renewed zeal, and have thereby demonstrated its proper sphere of usefulness in medicine.

The Swedish method of manual treatment consists of different movements termed "Swedish movements." The movements are a form of calisthenics, the object of which is to exercise the natural function of a muscle, set of muscles, articulation, or limb, with the beneficial result of overcoming existing unnatural or pathological conditions. The movements are divided into passive and active. Massage is classed under the head of passive movements.

In adopting a system of applying massage, I have modified the methods of Dr. Mezger of Amsterdam, to con-

form to the special purposes of dentistry. He divides massage into four different manipulations; First, *effleurage* (centripetal stroking.) In general massage, this manipulation performed upon any portion of the body, as the leg or arm, consists of centripetal stroking (toward the heart.) This movement is similar to that of a carpenter's plane—a forward and backward motion and is performed with the palm of the hand, tips of the fingers or thumb.

Second, frictions, which are strong circular manipulations, given with the thumb or tips of the fingers.

Third, *petrissage* (kneading) is performed by the thumb or index finger. In general massage, an operator picks up a special tissue, muscle or tendon, and placing one finger on each side of the part, proceeds in centripetal motions with a firm pressure.

Fourth, *Tapotement* (percussion) which is divided into four kinds.

(a) *Clapping*, performed with the palms of the hand.

(b) *Hacking*, with the ulnar border of the hand.

(c) *Punctation*, with the tips of the finger.

(d) *Beating*, with the clenched fist.

Before commencing massage care must be observed in making an accurate diagnosis of the case; for upon that depends the nature of the manipulations, their force and frequency and the length of time during which they are to be employed.

In explaining the mode of performing dental massage, I will select a typical case, and describe the manipulations and *modus operandi* adopted. I will consider an acute pericementitis associated with pulpitis.

The first important point to be observed by the operator is that his position by the side of the patient, is easy and natural. In performing manipulations on the left side, the operator stands to the right of his patient and uses the thumb and fingers of the right hand for manipulating, and if necessary, the left hand for the application of a napkin. In manipulating the right side he stands to the left side of his patient using the fingers of his left hand.

The position of the hand and fingers is of much importance. The operator may use the fore finger or the middle finger, or both in manipulating, supporting the thumb on the adjacent teeth, as a pivotal or fixed point, that it may serve as a support and guide. The fore-finger of the other hand serves to hold up the corner of lip.

Again, the thumb may be used to perform massage, while the four fingers of the same hand rest on, or grasp the cheek.

Commence, with the introductory massage, which consists of *effleurage*—centripetal stroking,—around the affected part, and not *directly* over the seat of the inflammation, as thus the tendency would be to cause increased pain and inflammation. If we have a molar tooth, commence the stroking at the central incisors on the healthy tissue, using the thumb, fore, or middle finger for stroking. The stroking should be gentle at first, using scarcely any pressure. Continue this manipulation toward the affected tooth. The healthy tissue beyond should be similarily stroked.

This causes a soothing and anæsthetic effect, which enables us to approach gradually near the seat of the inflammation, causing less or even no pain at all, and the circulation is restored, so that exudations are carried off more easily. Carefully graduate the force of the manipulations, so as not to bruise the parts, but at the same time, a slight pressure must be used that the operator's fingers shall not slip.

Pain is relieved by the removal of the pressure from the terminal nerve filaments. To demonstrate this, it hardly needs the experiments of Glax and Klemensiewiez, who have proved that in an inflamed region, in consequence of the abnormal activity of the vascular walls the lymph spaces are so choked up by the exudations and products of inflammation poured into them, that their outlets become insufficient, and the efferent vessels are thus compressed and the circulation impeded. Therefore if we

exert pressure upon an inflamed region already suffering under partial compression of its efferent vessels, it may injure rather than benefit.

We should manipulate cautiously until having gradually approached the seat of the disturbance, gentle stroking may be used directly over the pericementitis. Follow this by deep manipulations, gradually increasing the pressure, which can be considerable, without causing pain in a part that but a short time previous was very responsive to the touch.

When this stage of the operation has been reached, recourse to "frictions" can be had, starting from the anterior part of the mouth, and manipulating toward the posterior portion, using the fore-finger. After applying friction, we again use centripetal stroking, which is always used before and after frictions.

One of the diagnostic points, in cases of pericementitis, is that the tooth gives evidences of a sense of soreness on tapping it, seeming longer than the others.

In massage, I take advantage of this fact, and during the different stages of manipulations I test the tooth by tapping it with an instrument, and if the soreness becomes less, I know that the treatment is beneficial. In certain acute stages, the soreness disappears almost entirely when the manipulations are finished. After using stroking and frictions, *petrissage* (kneading) the third form of massage is applied. This manipulation consists of a series of small movements, performed by the fore-finger or thumb, and it differs from friction, because in the latter very little pressure is exerted, while *petrissage* consists of frictions with an additional pressure. However, I now use a modified form of kneading, discarding the circular movements, as I find at this stage of the manipulations, by using plain centripetal stroking and by giving an intermittent pressure, the same effect is produced more easily. The gum now has a resisting surface—slightly roughened similar to a piece of erasing rubber. By pressing the finger along the

gum an intermittent jarring pressure is produced, similar to that felt by the finger on a piece of rubber, on which, without pressing, a resisting and not a sliding motion will result. Little, or in fact, no pressure should be used with this mode, as each resistance develops the succeeding pressure, the noise of which can be distinctly heard.

Tapotement (percussion) is the last manipulation used. Its application was a difficulty not easy to overcome, therefore I devised a small appliance for use in the dental engine, thus accomplishing the desired manipulation, which is a combination of clapping, hacking and beating. The appliance consists of a mandrel or shaft, to fit in the hand-piece of a dental engine. At the end is a small metal hub, and attached to it at right angles with the mandrel, by means of a cap screwing down, are three pieces of elastic French tubing, one-eighth of an inch in diameter, and one inch or one inch and a half in length—arranged like the spokes of a wheel radiating from the centre. When this appliance, the *percuteur*, is revolved in the hand-piece, their elasticity allows a succession of light blows to be given, the intensity of which is regulated by the speed of the engine.—*Dental Mirror.*

(*To be continued.*)

ARTICLE VI.

SOME PRACTICAL POINTS INVOLVED IN THE RELATION OF THE UPPER TO THE LOWER TEETH.

Mr. Matheson grouped his remarks under the following heads:—(1.) The articulation of the teeth in relation to the etiology and treatment of approximal decay. (2.) Irregularities of articulation as productive of pathological conditions of the alveolo-dental periosteum. (3.)

The "bite," as affecting certain modes of treatment adopted in the correction of irregularities. Speaking under the first head, he stated that the "bite" held an important place as a factor in the production of approximal decay, for owing to its action, food became wedged into approximal spaces, and by decomposition, promoted decay. Sometimes the very beginning of decay was due to this cause, and even in the larger number of cases where the actual inception of disease occurred before there was any interspace to admit of the lodgment of food, yet when once the coronal wall of the cavity gave way, allowing food to enter in appreciable quantity, the rate of decay was generally much accelerated, and its ravages made to extend rapidly over the whole approximal surface. In those instances where the lodgment of food was the primary cause of decay, the space which admitted the food was due to one of three things, either to simple want of contact in two neighboring teeth otherwise normal, or to a flat instead of a contour filling having been employed on one or both sides of the space, or to the injudicious use of contour instead of flat fillings. Much might be done in the way of operative interference to limit or prevent the action of this predisposing cause to caries, by contour fillings on the one hand, and judiciously shaped spaces on the other; the use of both methods being demanded by the varying conditions met with.

In dealing with approximal cavities, one's aim must be as far as possible to achieve three things, viz:—(1.) To prevent the recurrence of decay. (2.) To render the tooth under treatment useful in mastication. (3.) To protect the gum from irritation. To the question, in what circumstances did contour filling accomplish these things better than any other method? the answer was simple, viz.: when by contouring the filling could be brought into *close* contact with the adjoining tooth. Apart from the question of appearance, the whole value of a contour filling lay in its knuckling up to the neighboring tooth so as to entirely

prevent the lodgment of food between the two neighbors, this lodgment being the fruitful source of recurrence of decay, irritation of the gums, and inability to properly masticate. Contour filling was called for then, when the tooth to be treated was standing so close to its neighbor that a reasonable amount of contouring would restore the normal relation of the two. This could be done in the majority of instances, but the minority consisted of not a few cases in which the diseased tooth stood so apart from its neighbor that a restoration of its normal contour did *not* restore the normal relation of the two teeth. In these circumstances, contouring was bad practice, and recourse must be had to flat fillings and judicious shaping of surfaces forming the mesial and distal walls of the space. Broadly speaking, this shaping consisted in making the walls boldly divergent, and very smooth and straight. Sometimes, in order to render the space as non-retentive, and at the same time sacrifice as little tooth substance as possible, the original space might be deliberately increased by means of gutta-percha or wool and mastic before finally shaping and filling. As to the value of such spaces, it could not be denied that, properly made and used only where contouring was inadmissible, they conduced to the comfort and safety of both teeth and gums. It could not however be too strongly maintained that between full contour and wide space there was no middle course, though which to adopt was by no means easy in every case to determine. Desiring to speak without bias, Mr. Matheson was inclined to say, "When in doubt play contour."

It did not infrequently happen that one had to deal with teeth, the relation of which to their neighbor and to the bite necessitated their restoration in contour, but in which disease was so very extensive as to render the wisdom of contour filling questionable. In such cases, the use of all gold collar crowns was invaluable, or in the case of bicuspids, all gold, faced with porcelain. The particular advantage of this form of crown lay in the fact that it

could be contoured out in any direction or to any extent, so that it knuckled tightly against the adjoining teeth, and antagonized exactly with its opponents; whilst the collar gave a security and finish which could be obtained by no other method, and produced, if properly adjusted, absolutely *no* irritation of the gum after the day of insertion. Mr. Matheson's own experience of this method had tended to convince him that perfect adaptation of the collar could only be obtained by fitting it to the root in the mouth—he had no faith in the use of a model for fine fitting. As to the modelling of the articulating surface, there was no question in his mind, that the best way was to strike it upon a cast obtained from a wax model, built up and carved for each case, rather than by the use of the die plates sold for the purpose, which made each crown a stereotyped and inartistic copy of every other. Partial gold crowns rendered excellent service where the amount of sound tissue was such as not to warrant its removal for the sake of inserting a complete crown, while at the same time the carious cavity was so far spreading as to make the security and durability of a larger filling quite a question of chances.

Under the second head, Mr. Matheson referred to the periosteal mischief set up by fillings insufficiently cut down to articulate accurately with antagonizing teeth. The inflammatory disturbance varied in intensity; fully pronounced periostitis was rare, more commonly the condition was one of irritation rather than inflammation. A curious point, in many cases, was the sensitiveness to thermal irritants, such as generally characterised irritation of the pulp. Similar symptoms to those named were due, not only to badly finished fillings, but also to a disarrangement in the articulation of one or more teeth produced by the forward pressure of an erupting wisdom tooth. In like manner, the eruption of the second, and even the first permanent molars, in some few instances, produced similar results, as did also the extraction of teeth.

Coming to the last division of his paper, Mr. Matheson limited his remarks to the consideration of the removal of molars or bicuspids for the relief of a general overcrowding of the arch as a whole. Having discussed and defended judicious extraction as against retention of the full number of teeth, he then dealt with the question as to which teeth to remove. Agreeing that the four first molars were the best to get rid of as a rule, he pointed out that many cases, for reasons mainly concerned with the "bite," indicated one of the bicuspids as the tooth to be sacrificed. Bearing in mind the value of the first molar as the chief grinding tooth, the comparative condition of molars and bicuspids ought to be most carefully examined and weighed at the time extraction is decided on. Should the loss of the first molars, after due consideration of all the circumstances, be finally determined on, it was nevertheless generally of the utmost importance that these teeth should be patched up, kept comfortable, and if possible retained until the second molars were quite erupted, and this for three reasons: first, that if the extraction were done at an earlier date the health of the patient would be seriously endangered by inability to masticate properly; second, that the second molars tilt less the later the extraction of the others takes place; and third, that early extraction may injuriously affect the position of the incisors by leaving them and only partially erupted bicuspids to bear all the strain of the "bite."

With reference to "Raising the bite," made necessary in those cases of irregularity where projecting incisors are kept in their abnormal position by the close contact of the lowers, the methods for accomplishing this would vary in detail according to the circumstances of the individual case in hand, but a typical appliance for the purpose, was a simple vulcanite plate made to cover the palate *without* capping any of the teeth. This being worn for some time would prevent the lower incisors from rising any more, their tips being made to impinge against the vulcanite, whilst it allowed of the molars lengthening.

"Jumping" the bite. This unscientific but useful term had been applied to an operation which, when it could be accomplished, was a very pretty one, and one which helped very materially to improve certain mouths. By its means such a sudden alteration is made in the whole articulation, as to justify the use of the word "jumping." Its peculiarity consisted in this, that whilst nearly every other regulating operation aimed simply at altering the position of the teeth in relation to the jaw which carried them, this operation altered the relation existing between the jaws themselves. In other words, the bite is "jumped" by the lower jaw suddenly, in the course of a few days, being made to close upon the upper, in a manner entirely and markedly different to that in which it has been accustomed to close. The operation would be called for in cases where the upper incisors project, where the lowers bite far behind them, and where, besides these conditions, the bicuspids and molars interarticulate abnormally, the lowers closing too far back, by the whole width of a tooth; the chin being consequently very retreating and the whole facial expression weak and foolish. What had to be done here if possible, independently of some retraction of the upper incisors, was an alteration in the position of the lower jaw, so that the chin might be brought bodily forward. This desirable end might be attained by various means. Having referred to a most interesting case communicated by Dr. Bogue and printed in the *Dental Cosmos* for May, 1887, Mr. Matheson mentioned a somewhat similar case recently occurring in his own practice. Having drawn back some prominent upper incisors in a case with a markedly retreating chin, and desiring to keep them in position, he attached a retaining wire to gold caps made to fit the second upper bicuspids—the first molars being gone, and the second scarcely long enough to furnish a secure hold. In order to prevent the bicuspids themselves being brought forward, instead of the incisors being held back, he furnished the caps with tiny inclined planes, directed down-

wards and backwards for the lower bicuspids to bite against. In a week's time he saw the patient, and was not a little pleased to find that not only had the end he had in view been accomplished, but the lower jaw had come right forward by the width of a tooth, and the retreating chin offended the eye no longer.

It might be observed that in both cases the movement of the lower teeth was due, not to any active mechanical interference with them, but to a spontaneous action on the part of the lower maxilla, when once it was set free from the abnormal position that it was locked in by the bite.—*London Dental Record.*

ARTICLE VII.

THE DANGERS ARISING FROM SYPHILIS IN THE PRACTICE OF DENTISTRY.

BY L. DUNCAN BULKLEY, A. M., M. D.

[Attending Physician to the New York Skin and Cancer Hospital, etc.]

We will now consider some of the observed facts in regard to the communication of syphilis in dentistry, and afterwards examine the modes of transmission and the means of prevention. Our clinical study will naturally divide itself into two lines of thought: 1, in regard to the dangers from syphilis to *patients* undergoing dental operations; and 2, in regard to dangers to the *operator* from the same source.

First as to the dangers to the *patient* from exposure to the syphilitic poison during dental operations:

Inasmuch as it presents many points of interest, relating both to the patient and operator, I may be allowed first to recite the case alluded to, which came under my

own observation and treatment, and which first called my attention particularly to the subject.

Mr. X. W., a gentleman of intelligence and position, aged 60 years, came to me September 11, 1884, on account of a sore on the tongue, which he feared to be a cancer. The history was, that some ten weeks before his first visit, he had first noticed a little point of soreness, which had gradually increased in size, in spite of treatment, until latterly it had come to give him considerable annoyance, so that he was conscious of its presence at all times; the true nature of the sore had evidently not been recognized.

On examination, there was found on the right side of the tongue, about an inch from its tip, a hard, inflamed mass, nearly half an inch in diameter, the center ulcerating and the edges somewhat everted; it was not painful except when irritating food or drink touched it. The two upper molars were found to have sharp and rough edges, and he had been wearing a red rubber plate until recently. There was a small and painful gland beneath the jaw on that side, slightly enlarged.

Thinking that the ulcer might possibly be due to irritating local causes, he was given a soothing mouth wash, and an alkali internally. Five days later there was a marked improvement in its condition; the ulcer had a less angry look, but its edge was more clearly defined as the inflammatory element had somewhat subsided. He had been, of his own accord, to his regular dentist, and had had the roughened teeth made smooth, and had left out his set of artificial teeth.

From a careful second study of the case, I then felt convinced that the sore was a chancre, a primary lesion of syphilis, and he was immediately put on antisyphilitic treatment; the general eruption and other symptoms which followed a few weeks later rendered the diagnosis certain, together with the remarkable manner in which the sore healed and symptoms vanished under the proper treatment for syphilis.

In searching for the mode by which the syphilitic poison had gained entrance, it was learned that, during the month or so previous to the appearance of the sore upon the tongue, he had, through the persuasion of a friend, been under the care of a dentist of the cheaper, advertising order, who, he had noticed, was not at all cleanly either in his person or with his instruments. He could not locate the exact date of the injury of the tongue by the dental instruments, but work had been done in that locality, and he remembered the instrument occasionally slipping, as will often happen, inflicting injury to the soft parts. He was a married man with a family, and was very desirous of learning how he had become infected; he had certainly not been exposed in sexual intercourse, nor in any other manner which we could discover.

The interesting points in the case are: First, that while the proof is not absolute that he was infected in the dentist's chair, still the circumstantial evidence is so strong that little, if any, doubt can be entertained that the poison came through this channel. The habits and ways of the particular dentist were such that poisonous material from the mouth of a previous syphilitic patient could readily have been transferred on instruments, or otherwise, to the wound made in the tongue, either by the sharp teeth or by a slip of an instrument. The second interesting point is, that this patient, before the true nature of the disease was ascertained, had been to his own regular dentist for smoothing the teeth, and so had certainly exposed him, and others through him, to the poison, which was secreted freely from the raw surface of the chancre.

The earliest recorded cases of the transmission of syphilis in dental operations are in connection with the transplantation of teeth, during the last quarter of the eighteenth century.

Sir William Watson * published a case of this descrip-

* Watson, "Transactions of College Surgeons," 1785. iii., p. 328.

tion, and John Hunter† relates two similar cases about which there can be no doubt. J. C. Lettsom‡ also recorded three cases; of these, one was personal, one seen by a Dr. Hamilton, and the third occurred in America, having been observed by Kuhn, in Philadelphia; these gentlemen furnished notes of the cases to Dr. Lettsom. This mode of transmission does not occur again in literature, to the knowledge of the writer, although Gibier§ says that "Cases have been recently related." In view, however, of a recent revival of the operation of tooth transplantation, or implantation, it is quite possible that the future may furnish fresh instances of this mode of the innocent acquiring of syphilis.

From this period no other causes of the transmission of syphilis through dental procedures are found recorded for nearly a century; indeed, not until the advent of modern operative dentistry and active medical observation.

The first case met with is one reported by Dr. C. W. Dulles,‖ of Philadelphia, and which was also seen by the late Dr. Maury. The patient, a female domestic of excellent character, developed a chancre of the lip two weeks after a visit to a dentist; on that occasion he extracted a tooth, and later did some cleansing of the teeth. Although no confirmation was obtained, it seemed reasonable to suppose that the operation of extraction was in some way responsible for the inoculation.

Dr. F. N. Otis* also mentions a chancre of the lip which occurred in a gentleman "about three weeks after a morning spent in a dentist's chair."

Lancereaux† relates a similar case of chancre of the lower lip in a woman, after the extraction of a tooth and

† Hunter, "Treatise on the Venereal Disease," 1st. Engl ed., 1786: 1st Amer. ed., Philadelphia, 1818, p. 362.

‡ Lettsom, "Transactions Lon. Med. Soc.," vol. i., 1787, p. 137.

§ Gibier, "Ann. de Dermat. et de Syph.," 1882, p. 129.

‖ Dulles, "Phila. Med. and Surg. Reporter;" Jan., 1878.

* Otis, "Lecture on Syphilis," New York, 1881, p. 102.

† Lancereaux, "Proc. Acad. de Med. de Paris," "Union Med.," 1889, xlviii., p. 655.

other dental work, and Giovannini,‡ of Bologna, has reported a chancre of the lip, apparently from a dentist's instrument.

Leloir§ mentions having seen a man with chancre of the gum, in whom the infection seemed to have taken place in consequence of cleaning and filling a cavity in a tooth, with soiled instruments. Lydston‖ has likewise reported the case of a woman with syphilis, in whom the chancre on the gum, below the lower middle incisors, appeared to be the result of some cleaning and repairing of the teeth done three weeks previously; the glands beneath the jaw were enlarged, beginning a week or more after the appearance of the sore on the gum.—*Extract from Paper read before the New York Odontological Society, April, 1890, and printed in the International Dental Journal.*

ARTICLE VIII.

SIMPLE METHOD FOR CONTROLLING EPISTAXIS.

Dr. W. W. Parker, of Richmond, Va., says, in the New York *Medical Record*: The plan of arresting hemorrhage from the nose, which I here describe, I have used for thirty years without one failure. When I first began to practice I used Bellocq's instrument, but I found it painful, and, in small children, exceedingly troublesome of application. Two months ago a man twenty-three years old, in this city, was operated upon for irregular septum (a small part of the bone was removed), which was followed by troublesome hemorrhage. The operation was by a very skillful specialist, who, upon application of the patent the

‡ Giovannini, "Le Sperimentale," 1889, p. 262.
§ Leloir, "Lecon sur la Syphilis," 1886, p. 62.
‖ Lydston, "Jour. Amer. Med. Assoc., 1886, vi., p. 654.

day after the operation, plugged the posterior nares with difficulty. But the hemorrhage persisted for three days, when the patient, whose father's family I had attended for many years, applied to me in company with his father. I of course, declined to have anything to do with the case, and urged him to return at once to the specialist who could do everything that was necessary. This he positively refused to do, and said if I would not attend him he would get some one else. He had visited the doctor three times, but the bleeding continued. As it was ten o'clock at night when he came to my office, I told him I would stop the bleeding and would see his doctor next morning and get him to call at the patient's house. This I did. I stopped the bleeding at once, and kept the patient and his father in my office till twelve o'clock at night to see if the hemorrhage really was arrested. This was the last of the bleeding. This man was of a hemorrhagic diathesis, and some three weeks after this, he had hemorrhages from the lungs, which had continued occasionally up to this date. At the Red Sulphur Springs of Virginia he gained twenty pounds but the bleeding from the lungs continued. He is of a phthisical family. I have been thus particular so that I might satisfy the reader that this was a bad case of epistaxis.

My plan is not only effectual, but is easy of application and absolutely painless, and can be probed in the smallest patients. The little device which I use is made of fifteen of the long threads of patent lint, size three and one-half or four inches long, which I double on themselves and tie in the middle, and let one end of the string be six or eight inches long so as to pull the plug out when necessary. When doubled on itself it looks like a "comet" in miniature with a nucleus and thirty tails (or twice the number of threads used). A probe, or soft piece of pine but little bigger than a match, is pressed up against the centre, and it is passed back upon the floor of the nasal cavity and pushed on till you reach the posterior nares. This will be

known both by the resistance and the length of the probe, or the depth which you have reached. Then slowly withdraw the probe and plug the anterior nares and you have arrested the bleeding. These twenty or thirty ends floating in the blood at once coagulate it. The passage of the soft lint gives no pain whatever. In persuading children to submit to the operation, I often pass the lint up my own nose to satisfy them it gives no pain. If lint is not at hand I use the largest size spool cotton.

Some years ago I called the attention of one of our local societies to this matter, and it was mentioned in a local journal, but attracted no attention. Seeing the notice of Dr. Fridenberg's method in the *Medical Record*, I send this to you hoping it will have a wider circulation. Any sensible layman can perform this operation. Many years ago I was wont sometimes to remain at the patient's house for hours, fearing a return of the bleeding, but do so no longer. The plug is removed in from twenty-four to forty-eight hours. It gives no pain and the patient is willing for it to remain. The other methods are all painful in execution, and the discomfort, while the plug remains, is very considerable.

ARTICLE IX.

THE COMBINATION OF TIN AND GOLD AS A FILLING-MATERIAL.

BY DR. H. F. HAMILTON.

[Read at a Meeting of the American Academy of Dental Science, May 7, 1890.]

When Dr. Charles H. Abbott, son of the late Dr. Frank Abbott, of Berlin, was in this city some years ago, he told me of the value of tin and gold as a filling-material, and asked me to try it, but did not go into particulars as to

its special advantages or methods of working. At that time, in weak teeth of adults and in children's teeth, I was using tin, either foil or Robinson's metal, to some extent, and in some doubtful cases, instead of these, I tried the tin-gold accordingly to my own ideas as to how it should be used. From time to time I saw these fillings; and their appearance encouraged me to more extensive use, until now I fill several cavities each day with it. I am led to speak of it to-night, not to claim any ideas or methods, but simply to call your attention to it and ask you to give it a trial. I use it where formerly I should have used cement and gutta-percha, and not in cavities where gold will stand, except those in the crown of the upper wisdom teeth.

In all my work with tin-foil I have seen decay come only twice, which meant undoubtedly defective work. I was very clumsy in my earlier efforts, not having had such a knowledge of the working of soft gold as many of you have, and from that reason two or three fillings came out piece by piece; but continued practice soon remedied that, and now I find tin-gold to be as easy and sure to work as gutta-percha. The theory and advantages of this method are admirably set out by Dr. Miller in the May, 1889, number of the *Dental Cosmos*, and his article will tell you far more than I can of my own knowledge.

I use it chiefly in crown cavities, in molars for young persons and the wisdom teeth of adults; in small approximal cavities back of the cuspid for all ages, and in nearly all buccal and palatal cavities. I never put in a gold filling of any size in an approximal cavity in the bicuspids or molars without a few pieces of tin-gold at the cervical wall. I often fill two-thirds of the cavity with tin-gold and then build on a grinding surface with crystal gold or annealed cylinders. I top the tin-gold out with gold in this way for appearance's sake, and I also feel surer of my contour; although with more experience I should have no fear of the latter not being perfect.

I use it with wedge-shaped soft-foil pluggers, and prepare it for each cavity by rolling a part of a sheet of tin inside the same proportional part of a sheet of gold and cutting it off so as to leave the pieces diamond-shaped. There is a foil-trimmer that belongs with the Harvard set of pluggers that I find very useful in condensing.

I will read a few extracts from Dr. Miller's paper, and in conclusion ask you to try tin-gold. I feel that it has made life easier and my work much more satisfactory to myself.—*International Dental Journal.*

Editorial, Etc.

A TOOTH DRAWN BY A HEN.—Virginia is thus far the only known state which boasts of hen dentists. Some time since the *Page County Courier* published an account of a hen there angrily flying at a farmer and pulling out one of his teeth. George E. Heath, who lives in Hanover county, a short distance from Ashland, was in the city. He states that some time ago he went to his hennery and attempted to take a hen off her roost, when she flew in his face, pecked him in his mouth, and took out a tooth which had been troubling Mr. Heath for some time, and which he intended having extracted. This is the second hen dentist in Virginia.

ANTIQUITY OF ARTIFICIAL TEETH.—Dr. Van Marter, of Rome, Italy, has discovered in many of the skulls in different Etruscan tombs, as well as in those deposited in the various museums, interesting specimens of ancient dentistry work and artificial teeth. The false teeth were in most cases carved from those of some large animal, and in many instances were fastened to the natural ones by gold bands. The skulls examined date as far back as six centuries before Christ, which proves that dentistry is not a modern art.

A REMARKABLE SURGICAL OPERATION.—Professor Von Bergmann, of Berlin, is said to have lately conceived and carried out an operation which must be considered a marvelous tribute to the progress of modern surgery. Two patients were brought to him, one of whom was suffering under an injury which necessitated amputation of the thigh, and the other from a disease of the humerus, which called for excision of a part of that bone. The professor proceeded to operate upon the first of these patients, and he then removed the diseased portion of the bone from the arm of the second one, leaving necessarily a gap. This he actually filled with a portion of the healthy bone from the amputated leg, and a successful union was made. The second patient was by this clever operation endowed with a serviceable arm, instead of one which would probably have been useless.

THE YOUNGEST DOCTOR.—The Southern Medical Society which met recently at Atlanta, Georgia, elected to honorary membership Master Venner Tensch, of Fort McPherson, Ga. Although only five years old and a kindergarten student, he has a phenomenal knowledge of anatomy, lectures upon which subject he attends, and charts relating to which he studies instead of pictures. In an exhibition before the society he gave the names of all the bones in the body, and also described their functions, divisions, tuberosities, tubercles, etc. He appeared fully to appreciate the honor conferred upon him, and thanked the president and gentlemen for their action. The child is known as Doctor Albert, and chooses his friends from among the doctors and medical students instead of playing tops and marbles with the boys.

THE MALLEABILITY OF GOLD.—The gold beaters of Berlin, at the Paris exposition, showed gold leaves so thin that it would require 282,000 to produce the thickness of a single inch, yet each leaf is so perfect and free from holes as to be impenetrable by the strongest electric light. If these leaves were bound in book form it would take 15,000 to fill the space of ten common bookleaves.

AN ELECTRIC PLANT.—A plant has lately been discovered in India which is possessed of a high degree of electrical power. By breaking a leaf off, the hand is said to receive a shock about equal to that produced by the conductor of an induction coil. A magnetic needle is affected by it at six inches. The electric power of the plant is stated to reach its maximum in the afternoon and to disappear at night. It is much increased during a storm. The soil on which the plant grows contains none of the magnetic metals, iron, cobalt or nickel.

Monthly Summary.

PRACTICAL SUGGESTIONS.—*By Dr. E. E. Shattuck, Kansas City.*—One of the most important things to consider, is our dental office. It is there we pass the best part of our life. Our failure or success in a business way depends more on our surroundings than most of us are aware. Intelligent and cultured people look to the environments on entering an office when calling to make the first appointment, and your ability as a dentist will be very correctly gauged by their first impression. It need not necessarily be furnished expensively. The one thing needful is to have it clean and neat in every detail. It should have a pleasant, inviting appearance, and tastefully arranged. This has an elevating influence on the character and disposition of the dentist. He is inclined to be more cheerful and patient with nervous and exacting patrons. Do not be afraid of spending too much money in furnishing your office. It will be a good investment. I never saw a clean, well-arranged dental office but the dentist himself was neat and particular in his appearance, and also a first-class workman. I can always tell what kind of a dentist he is by his office, or the kind of an office by the dentist. We ought not to consider this subject in regard to a well-kept office of little or no importance. It will always bring a better class of patients who are willing to pay the price we ask, and this is a

stimulant for us to excel in each succeeding operation. It is a duty we owe to the profession to do all we can to improve ourselves in dentistry.

Before beginning an examination, or operating on the teeth, always wash your hands, and be sure your finger nails are clean. Unclean finger nails are disgusting under all circumstances. Always use a clean napkin or towel for each patient. Always use a new piece of rubber dam for each patient at every sitting. Do not save the same piece to be used at their next engagement. They will have their doubts about its being the same one they had before. It makes a bad impression and adds but little to our profits at the end of the year. Always use as thin rubber dam as possible. Use fine floss silk, or linen thread well waxed. Soap the dam where you have punched the holes for the teeth; you will be surprised how easily it is adjusted where the teeth are crowded. Use cocaine on the gums around the anterior teeth. The patient will lose all dread while applying the dam, and in furnishing approximal cavities the operation will be painless. Always dry out the cavity before commencing to excavate, to enable you to see in what direction the decay has extended. All operations should be made as painless as possible.—*Archives of Dentistry.*

THE NATURE OF KOCH'S LYMPH.—Prof. Koch has made a partial statement as to the composition of his lymph. From the beginning of the treatment of tuberculous affections with this fluid, its composition has been an open secret. There is nothing in the recent statements of Prof. Koch that will lead any one to be much wiser on the subject than they previously were. The simple statement that the lymph consists of a glycerine extract derived from the pure cultivation of tubercle bacilli does not enable one to have very clear ideas as to the nature of the agent. Prof. Koch says: "Into the simple extract there naturally passes from the tubercular bacilli, besides the effective substance, all the other matter soluble in 50 per cent. of glycerine, consequently it contains a certain quantity of mineral salts, coloring substances, and other un-

known extractive matters. Some of these substances can be removed from it tolerably easily. The effective substance is insoluble in absolute alcohol. It can be precipitated by it, though not, indeed, in a pure condition, but still combined with the other extractive matter. The coloring matter may also be removed, rendering it possible to obtain from the extract a colorless, dry substance containing the effective principle in a much more concentrated form than the original glycerine solution. For application in practice this purification of the glycerine extract offers no advantage, because the substances so eliminated are unessential for the human organism."

Prof. Koch himself appears to have no definite knowledge as to the nature of his lymph..—*Montreal Med. Journal.*

COFFEE AS A DISINFECTANT.—The *Deutsche Medizinal-Zeitung* for September 22, 1890, quotes the following from the *Journal de Medecine d' Algerie.* On an extremely hot day in Algiers, Dr. Barbier and some officers were directed to a village inn, to make an examination of the body of a murdered man. They were led to a small apartment in which the body lay, but were met by so intolerable an atmosphere that they at once retreated. Upon request a plate of ground coffee was brought and sprinkled upon the cadaver, the floor and the walls. The horrible stench disappeared and the examination was proceeded with without interruption. Gratified with the result, Barbier soon found occasion to make a similar use of coffee, with equal success, in the case of a body which had lain in the water for a week. He now began to use coffee in this way in the treatment of foul ulcers, and with good results. He considers coffee an antagonist of the narcotic effects of tobacco, for which there is no better antidote. He also recommends the use of coffee for the disagreeable odor sometimes acquired by ice-chests for the preservation of animal foods. To preserve game, this should be first cleaned and then strewn with coffee. It was also observed that cholera bacilli and other microbes lose the faculty of multiplication in infusions of coffee.—*Med. and Surg. Reporter.*

CHLOROFORM AS AN ANTISEPTIC.—The *Lancet*, December 20, 1890, says, Salkowski has demonstrated as the results of his experiments that chloroform prevented fermentation and decomposition in milk and other fluids. M. Kichner (*Zeitschr. fur Hygiene*, viii, 1890, Heft 3) has also made some investigations in regard to this property of chloroform. He first showed that, when mixed with blood serum, no decomposition of the latter occurred, and then further showed the same action on milk, and also its purifying properties on waters known to be rich in bacteria, and again, on pure cultures of pathogenic and non-pathogenic organisms. The method employed was as follows: Chloroform was added in excess to the fluid to be experimented on; the vessel in which it was contained was then hermetically sealed and thoroughly shaken. The various specimens were kept at different temperatures—namely, that of body or air, or in an ice chamber. The contents were tested after variable periods of time, lasting from hours to years, by means of plate cultivations. The results obtained were that chloroform has a powerful destructive action upon a great number of bacteria, but does not kill their spores. The bacilli of anthrax, cholera and enteric fever, as well as the staphylococcus aureus, were quickly destroyed by chloroform. The spores of the anthrax, and tetanus bacilli were not affected by the drug. In spite of its presence the spores developed into bacilli, which were then rapidly killed. Kirchner considers from these results that milk to which chloroform has been added can be preserved for a long period, although we cannot be sure that it is free from spores which will eventually develop. Kirchner recommends its use for the preservation of fluids containing albumin, and especially for sterilizing blood serum, the composition and coagulating power of which are not appreciably altered by its presence, and its use as a cultivating medium is not influenced. The mixed fluids are best preserved at the ordinary temperature of a room and not in an ice chamber. Kirchner further

recommends chloroform water for the disinfection of wounds, and states that it is especially useful in gynecological and obstetric practice, and also for the disinfection of bed-pans, linen, etc., in epidemics of cholera and typhoid fever. He supports Salkowski's views as regards its favorable action on some intestinal affections, especially the diarrhœa of children. He also advises that it should be used in military campaigns for the purification of drinking water.—*Med. and Surg. Reporter.*

PHYSIOLOGICAL ACTION OF THIALDINE.—Thaldine, obtained for the first time by Woehler and Liebig, in the form of large crystals, of aromatic odor, which volatilize at the ordinary temperature without decomposing, is but slightly soluble in water, dissolves rapidly in alcohol and acids. According to *Les Nouveaux Remedes* for November 8, 1890, from experiments made with this substance the following conclusions were reached:

1. Thialdine is very poisonous in frogs in the dose of 1-3 grain for every one hundred and fifty grains body-weight, though much less poisonous in rabbits.

2. Its administration is followed in the frog by profound sleep, with loss of general and reflex sensibility, depressed sensibility of the motor nerves, while the muscular irritability remains intact. In the rabbit the anæsthesia is less intense, and interrupted by excitation.

3. Thialdine invariably causes slowing of the pulsations of the heart, which, nevertheless remain perfectly regular. It is only when given in very large doses, and then only immediately before death, that the pulsations of the heart become irregular.

4. When given in small doses, the slowing of the pulse is only transient. Injected in small doses in the excised heart, thialdine diminishes the number of pulsations, at first prolonging the diastole, after rendering the

contractions of the heart irregular and more rapid, and finally arresting the heart in diastole.

3. In large doses it slows at the outset cardiac contractions, and then leads to the arrest of the heart in diastole.

It would thus seem that carbo-thialdine and thialdine differ absolutely from each other as regards their physiological action. The first is an energetic tetanizer, and never produces irregularity of the heart, which it arrests in diastole. On the other hand, thialdine produces irregularity of the heart which, in the majority of cases, it arrests in systole; finally, while carbo-thialdine produces no effect on rabbits, thialdine is poisonous in them, though to a less degree than in frogs.—*Therapeutic Gazette*, January, 1891.

A READY INHALER.—In the *British Medical Journal*, November 22, 1890, Mr. Arthur H. Rideal gives the following description of a ready method of arranging what he says is a most effective inhaler. Take an ordinary funnel, and in it loosely pack some cotton-wool. On this sprinkle the medication (ol. eucalypti., etc), and then tie a piece of gauze or muslin over the funnel to keep the wool in position. Invert the funnel over some hot water contained in a breakfast cup, or other vessel, according to the size of the funnel, and an inhaler is obtained which is equal, as regards its utility, to the most elaborate.

CURES FOR NEURALGIA OF THE HEAD.—An English physician has recently asserted that head-aches and neuralgia could be stopped by blowing a solution of salt up the nose. A Swiss physician, Dr. Naegely asserts that he can cure neuralgia of the trigeminus by pressing up the hyoid bone.—*Medical Record.*

CAMPHO-PHENIQUE.—Dr. J. W. Downey, writing on this antiseptic in *Archives of Dentistry*, says: Campho-phenique is a germicide and antiseptic. Campho-phenique is absolutely free from toxic or caustic properties. Applied to the unbroken skin it produces no sensation whatever. On cut surfaces there is a slight burning sensation when first applied, followed by anæsthesia.

Now, which antiseptic is the most agreeable. The brassy metallic taste of the bichloride is intolerable, the taste and smell of carbolic acid and creosote are disagreeable to most people, and the odor and meagre antiseptic properties of iodoform should banish it from the operating-room. Campho-phenique has a pleasant odor and agreeable taste; this should establish its claim as the most agreeable germicide summing up, he says.

1st. That when used pure and undiluted, campho-phenique is one of the most efficient and reliable germicides and antiseptics.

2. Being non-poisonous and non-irritant, it is perfectly safe.

3. It is the most agreeable to the patient of any drug of its class.

As to special uses he advises it as a pulp canal dressing in the various pathological conditions, from recent devitalization to alveolar abscess. Here it will take the place of corrosive sublimate, carbolic acid, creosote, oil of cloves, iodoform, or any germicide heretofore used, except peroxide of hydrogen. If thoroughly rubbed on the gum, or injected with a hypodermic syringe, it acts efficiently as a local anæsthetic, not equal, however, to cocaine; but there are no constitutional effects following its use, and there is no danger of the tissues sloughing. It is quite efficient as an obtunder of sensitive dentine.

The very disagreeable ache which sometimes follows the extraction of abscessed teeth is almost instantly relieved by placing a pledget of absorbent cotton, saturated with campho-phenique, deep in the painful socket.

For chapped hands the following formula is advised:—

R—Campho-phenique - - -
Oil of cade - - - - aa 3j
Rose cosmoline - - - - ℥j
m. Sig.—Apply frequently.

Campho phenique should never be mixed with water or glycerine. It will mix in all proportions with alcohol, ether, chloroform, and all fatty substances. In dentistry it will seldom be necessary to dilute it at all.—*London Dental Record.*

ADMINISTRATION OF MORPHINE BY THE NOSTRILS.—As a rule, where persons dislike the taste of morphia, or where it is desired to have a rapid physiological action, the hypodermic method of administration is resorted to. This method is open to the objection that it requires a small surgical operation and that this sometimes is followed by the formation of an abscess.

I desire now to describe a new method of administering morphia, namely, through the mucous membrane of the nose —a method which has been thoroughly tested by me in over one hundred cases, in which the immediate physiological action of morphia was necessary. I have found it to be reliable and more prompt in its action than the administration of the drug by the mouth or hypodermically. It requires much smaller doses than is requisite in d sing by the mouth, and no larger dose than is usual for hypodermic administration.

The manner of administering morphia through the olfactory canal is simply by causing it to be snuffed up the nasal chambers, in the same manner and in the same way as snuff tobacco is used. The dose is divided into two equal parts, and each part is placed upon the end of the thumb and snuffed up into the nostril. The membrane being very soft and delicate it appears to be absorbed instantly. I have tried it on myself on several occasions and the absorption seemed almost instantaneous. Fifteen seconds after the introduction

of the morphia, I have blown my nose; and nothing could be found in the secretion. However, in poor qualities of morphia, the drug will not be absorbed as readily.

In cases where the nasal chambers are covered by crusts or dry secretion the cavities should be cleaned before administering morphia, care being taken not to snuff it up too strongly. If the drug is of a poor quality it will produce sneezing; but the narcotic effect will be the same.

When morphia is administered in the manner I have just described, it is tasteless, its action is rapid and the narcotic effect lasts for a longer period than when this drug is taken either by mouth or hypodermically.—CARL H. VON KLEIN, A. M., M. D., Dayton, Ohio; in *Med. and Surg. Reporter.*

CODEIN.—According to Lowenmeyer (*Deutsche medicinische Wechenschrift*, No. 20, 1890), codein is very little employed in Germany, notwithstanding the encomiums which it receives from physicians elsewhere and especially from the French. He therefore recently instituted an extensive series of observations in Jacobson's service at the Jewish Hospital in Berlin. Some five thousand doses of the drug were given to about four hundred patients, some of whom took it for weeks, and others for months; yet in no case did he observe any untoward results. He therefore recommends its use in place of morphine, rating it as a narcotic of somewhat lesser intensity than the latter, but on the whole superior, because of its freedom from danger. He especially endorses Dr. Lauder Brunton's assertion of the peculiar applicability of codein to the relief of painful affections of the abdomen. Gastralgia, colic, and the various visceral neuralgias seemed peculiarly amenable to its influence.—*Medical News.*

A NEW MIXTURE FOR USE IN LOCAL ANÆSTHESIA.—Dr. A. Dobisch, of Zwittau, has used, for the purpose of producing local anæsthesia, a spray, with Dr. Richardson's ether

spray apparatus, composed of ten parts of chloroform, fifteen parts of sulphuric ether, and one part of menthol. After one minute's application of this spray complete anæsthesia of the skin and neighboring tissues were obtained, which lasted for from two to six minutes, and sufficed for the performance of such minor operations as opening abscesses of the cervical glands, incising a deeply seated whitlow, and the excision of an epithelioma of the nose. In all the cases in which he employed the spray above mentioned the wounds healed quite satisfactorily.—*The Lancet.*

ISOCOCAINE, A NEW ANÆSTHETIC.—The *Pharmaceutical Record*, October 20, 1890, says if ecgonin is treated with caustic, soda or potassa, it changes into the isomeric isoecgonin. If the chloride of this base be suspended in alcohol, in which it is insoluble, and hydrochloric acid gas be passed into the mixture, it becomes clear. When evaporated to dryness, the residue taken up with water, the solution made alkaline and shaken with chloroform, beautiful prismatic plates of isoecgonin ethylether separate. Isococaine is obtained from this by heating with two parts of benzoylchloride for a short time in oil, both up to 150° or 160°. The melting point of isococaine is at 44° C., that of cocaine at 98°. With hydrochloric, nitric and hydrosulphuric acids, isococaine forms sparingly soluble salts. The process for making it has been patented by the firm Bohringer, in Mannheim. Its advantage over cocaine is a quicker production of anæsthesia. The oculist cannot use it, as it is even more of a local irritant than cocaine.—*Medical and Surgical Reporter.*

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ARTICLE I.—ORIGINAL.

PYORRHEA ALVEOLARIS.

BY B. F. ARRINGTON, M. D., D. D. S., ASHVILLE, N. C.

What is it and how to be treated? There is great diversity of opinion concerning the disease. Some contend that it is a constitutional disease, is hereditary, transmissible, &c., and requires to be treated with internal remedies; while others regard it a local trouble and treat it accordingly. I hold to the latter opinion and treat locally and am generally satisfied with results, and so are my patients, especially those who respect and carry out instructions as to the care of teeth and gums. There is no disease with which the human family is afflicted that has been so much discussed and written about by dentists for the past ten or twelve years as pyorrhea alveolaris, and no other disease, possibly, has been so variously treated and with as unsatisfactory results.

The dental profession are no nearer to gather to-day as to cause of the disease and best means of successful treat-

ment for cure than when first mention of the disease was made.

Dr. W. H. Atkinson, of New York, learned and scientific, and high authority in the dental profession, has said that "pyorrhea alveolaris means pus of the alveola sockets," and Dr. C. N. Peirce, of Philadelphia, prominent and distinguished in the profession as a practitioner and teacher, says "pyorrhea is pus in the socket." Both may be correct, but I do not think so. I believe and contend that pyorrhea is pyorrhea when the sockets are perfectly healthy and free from pus, as much so as when the disease has advanced and the sockets have become involved and hold pus in quantity. The disease has a beginning and it is always at the margin of the gum around one tooth or more, frequently only one or two teeth are involved in the incipient stage of the disease, then again we will find every tooth in either or both maxillary definitely involved. The disease is easily detected and comprehended after once seen and contrasted with a gum in a normal state.

The alveola process and tooth sockets never become involved until the disease is well advanced. The name *pyorrhea alveolaris* is erroneous and leads many astray, as above stated. The alveolus is never involved or in any way affected by the disease in the beginning, therefore should not be termed *pyorrhea alveolaris* but simply pyorrhea. A disease of the gum, which in course of progress, generates pus and will, if not interfered with, sooner or later, invade and destroy the alveola structure and cause loss of teeth.

In the beginning or incipient stage of the disease there are no calcarious deposits on the teeth and never are until the disease has made definite impression upon the gums, possibly after a duration of some months. When the deposits are once formed, a cure cannot be effected until all deposits are removed from the teeth. All the constitutional treatment, mouth washes, flowing and reflowing with strong

remedies the pus sockets, of which there is so much talk, packing around the teeth and deep down into the pus pockets with caustic paste, sacrificing and excising gums, application of copper bands, &c., will not effect a cure. The deposits must first be removed and effectively, or there can be no promice of relief and cure. It is often the case that we find a tooth or teeth with sanguinary or serumenal deposits well down the root and sometimes at the apex of root, which causes a pus discharge, loosening and ultimate loss of tooth or teeth, when there is no pyorrhea visible.

All is not pyorrhea alveolaris that is so called. Sanguinary deposits at or near the apex of roots is more difficult to treat than pyorrhea. The two affiictions should never be confounded. In the case of sanguinary deposit the pus is formed deep down in the socket and works up to the margin of gum, whereas in pyorrhea the pus formation commences above the margin of the alveolus and by degrees invades the entire process, to loss of same and loss of teeth. Every case of gum-waste, or recession of gum tissue we meet with is not a case of pyorrhea, far from it. In a genuine case of pyorrhea that has progressed beyond the incipient stage, we always find considerable tumefaction of gum with discharge of blood or pus, or both on application of pressure. In recession of gum (not caused by pyorrhea) we find the reverse, and I may say almost universally, instead of inflammation, tumefaction and discharge of blood and pus from the gum as in pyorrhea, the gum is often pale, contracted and shriveled. I have seen many such cases, and often recession of gum and loss of alveola process quite to the apex of the palatal roots of superior molars, with freedom from soreness or even tenderness under pressure, and no blood or pus to be found. In such cases the teeth never loosen as they do in pyorrhea. In well developed cases of pyorrhea calcarious deposits are always to be found, and blood or pus, or both, freely flow. In gum waste or recession of the gum there is no deposit as a

general rule, or very rarely; nor is there discharge of blood or pus. Very unlike derangements of gum tissue. Pyorrhea, if neglected, becomes offensive and loathsome, and causes loss of teeth. Gum-waste or recession progresses slowly without any painful, disagreeable or offensive feature, and never to the extent of loss of teeth. Pyorrhea can be treated and cured as surely and effectively as other diseases, but the loss of alveolus can not be restored by any process of treatment, nor can the gum ever be reunited to the teeth as before separated by pyorrhea, but with proper treatment can be made healthy and to fit closely to the teeth and around the necks of the teeth, so that foreign matters will not be forced between the gum and teeth under ordinary usage, that much can be accomplished and nothing more. To talk about restoring alveolus to roots of teeth after having been absorbed or destroyed by disease, slow in progress, is leading astray. Whenever the alveola process has been destroyed by and through a diseased condition of the gum, or by natural process of absorption, it is gone and gone for ever, no return to be looked for. Whenever a tooth has lost by pyorrhea three fourths of its alveolus support, it should be extracted, for the remaining alveola support is not sufficient to hold the tooth firm in place during the process of masticating food. A loosened tooth in the alveolar is a local irritant and a perpetual source of annoyance and will keep the gum in an abnormal condition.

Some dentists contend that the alveolus must be scraped, chiseled or burred away before the disease can be checked. During a practice of thirty seven years, and a part of the time making a specialty of this disease, I have never met with more than two or three cases that required the removal of any portion of the process and in those cases I would have preferred to treat by direct application of pure *sulphuric acid*, (not aromatic sulphuric acid, as some advise,) but the patients lived in the country and could not return promptly for treatment. In removing deposits from

the teeth, I always try to avoid touching or interfering with the alveolus as much as possible. When the deposits have been thoroughly removed and the gums properly treated, the alveolus will soon assume healthy action and perform normal function.

The alveola process in pyorrhea is never affected only as the effect of a cause, a diseased condition of the gums. This idea does not accord with the popular opinion of the day, but it is conservative and accords with reason and common sense and can be a fact nevertheless.

This is no new disease, possibly it commenced with Adam and has prevailed through all generations to the present, and is no worse now as a disease than it was hundreds of years ago, but there has never been much said about it until the past ten or fifteen years. I recollect distinctly far back in my boyhood days, fifty years or more ago, of several parties who lost many of their teeth that seemed to be perfectly sound; they would loosen gradually and drop out, or could be easily taken out with the fingers, as is the case now. Was the loss of teeth under such circumstances, that far back, caused by scurvy, as the disease was then termed, or was it pyorrhea alveolaris as it is now called? And if there is a difference, what is it and how shall it be recognized? The thing important and most important is to know how to treat and cure the malady. We may never know the cause of the disease nor be able to prevent continuation of it, nor how far back to go for first evidence of its existence, but we can treat and cure it. That is our province and duty; let us faithfully perform it to the best of our ability with the light we have to direct and guide us, and advise as best we can for the good of our patients, their comfort and health. Nothing more can be required of us. To learn how to check disease and mitigate suffering should be the zenith of our professional ambition. Some say we must go to the root of the trouble and find out the cause before we can treat

successfully; very absurd. Who knows the cause of *measles* or *typhoid fever?* Yet there is treatment and cure, and so it is with pyorrhea. So far no one knows the cause, but we can treat and cure it as effectually as many other diseases, and when we have done that, we ought to be satisfied and so ought our patients. Some advise to follow up cure with after treatment. Sometimes it is requisite, but not in the majority of cases. In treating the disease I never lance or excise any portion of the gum, matters not how great the congestion may be, nor to what extent the festoons have extended. It was an old feature in practice many years ago, but never was of any benefit towards effecting a cure. When a cure is effected, give definite instructions to patients as to regular use of tooth brush, tooth pick, &c., and to keep the teeth in a cleanly condition daily, and trust to nature to perform its offices rightly and favorably as you would in any other case of disease treated and cured.

Pyorrhea alveolaris, as the disease is termed, is in my judgment a local trouble, and not constitutional or transmissible as many contend. And it is, strictly speaking, a disease of gum tissue and not of the alveolus. The alveolus becomes involved only after the disease has made considerable and definite progress, hence only secondarily effected and wastes away through the agency of unhealthy matters generated in the gums. It yields readily to local treatment, and, when cured, is cured beyond doubt or questioning, but like other diseases, there may be a return of it. "Like causes producing like effects," then treat again if called upon and repeat treatment as you would in any other abnormal state of any organ or part of the human body.

Pyorrhea is no respector of persons, old and young, (seldom below the age of eight or nine,) rich and poor, white and colored, male and female, are all liable to be troubled with the disease, some more, some less. I have treated many cases for children not more than nine years

old, (but have never seen with children a case far advanced,) and onward to pass three score and ten. There is one peculiarity about the disease. It seems to produce a serious effect upon some constitutions and no unfavorable effect whatever upon others. I have known persons to be troubled with the disease for fifteen or twenty years, to the extent of loss of many teeth, and during the entire time enjoyed good health, ate heartily, slept soundly and never suffered a moment from indigestion. There are many such cases. Then I have known persons to experience great suffering, extreme physical debility, nervous prostration, dyspepsia, &c., during the continuance of the disease, and as soon as treated and cured, all distressing and unfavorable symptoms abated and in a few weeks the person would feel and look like a different being. I have in mind two gentlemen who were about equally affected with the disease (well marked typical cases) for a number of years, eighteen or twenty, both enjoyed excellent health and perfect freedom from indigestion, could eat heartily and with a relish great variety of table fare at all times without discomfort. One was a farmer by vocation and about fifty five years of age, very energetic and a laborious worker, and substited mostly upon substantial plain food in large quantity, and he used tobacco, chewed and smoked excessively. The other was a business man, lived in town, was forty-eight years of age, was rather indolent, liked to indulge leisure, was fond of high living, liked a variety of rich diet, delicacies, &c., never used tobacco, was equally healthy as the first; both were strictly temperate as to use of alcoholic drinks. One was reared and lived in a low flat, malarial country; the other reared and lived in the hill country or high-lands, free from malaria. One was light complected with delicate features, the other dark complected with coarse, strong features. Both had lost lower front teeth and several bicuspids from the effects of the disease. One had never used a tooth-brush, had sound teeth, not a decay visible. The other had used a brush occasionally

until gums became diseased and sensitive, but never afterwards and had scarcely a sound tooth in his mouth. Neither had any recollection of parents or any members of either family ever having suffered with such a disease and loss of teeth. Now the question arises, was the disease in either or both cases constitutional, inherited, received through transmission, or simply local, and did the same cause prevail to produce the disease in both cases? Who can decide? And what matters it, if the cause is not comprehended? Both cases were treated with the same remedy, *sulphuric acid*, and effectually cured. Multiplicity of remedies are of no avail in this disease. I have for thirty-seven years confined my practice to one line of treatment, but have at various times experimented with various remedies that have been suggested, but have never accomplished as good results as with my long tried and favorite remedy, pure sulphuric acid, diluted to suit respective cases. In the incipient stage of the disease with children or adults, the simple application of sulphuric acid and pulverized pumice with a suitable tooth-brush is all that is requisite for a cure. The disease further advanced to the formation of deposits upon the teeth requires additional treatment. The first thing to be done is to remove with appropriate, rightly shaped, smooth edge instruments (scalers) every particle of deposit; in this operation great care should be observed, for the smallest particle left adherent to the teeth will, if it comes in contact with gum tissue, prove detrimental and great hindrance to a cure. If there is neglect in this feature of the treament a cure cannot be effected; matters not how many remedies be administered, locally or otherwise. I have never yet met with a case, in which I realized necsssity for internal remedies. It is a disease which, when well advanced, will not admit of mincing treatment, but must be dealt with heroically and without fear of discomfort to patient. You must start right and push treatment forcibly regardless of a little hurt. No necessity for being rough, but persisently forcible for

effect in every effort from first to last in treatment is all important and compensates, both, patient and operator. I specify the use of smooth edge instruments for removal of deposits, for I contend that deposits should never be removed with sharp edge instruments as was the old custom, and is the custom of some practitioners in this day of reform and progrees. It is, in my opinion, bad practice and unjustifiable to apply sharp edge scalers below the enamel for removal of deposits; with sharp instruments it is utterly impossible to determine definitely when all deposits are removed. If the surface of teeth under the gum is scratched or scarred with a sharp instrument, it will serve as a local irritant to the gum, and the gum cannot be restored to a normal state until the cause of trouble is removed; therefore the importance and value of smooth edge scalers. After removal of calcareous and deposits and all foreign matter from the teeth, I then brush the teeth thoroughly with a small tooth brush, using sulphuric acid and pulverized pumice. I generally shorten the brush by cutting away several rows of bristles, and cut out every other row, so that every irregularity of tooth surface may be reached and polished by the brush and pumice. The acid will find its way where needed, around the teeth and into the deepest pus pockets. The pumice serves only to cleanse and polish the crowns and necks of the teeth and as far down the roots as the bristles of the brush will reach. I vary the strength of the acid to suit respective cases, seldom use it stronger than one of acid to five of water, nor weaker than one to thirty, and in a large majority of cases do not have to repeat application. Care should always be observed to see that the acid permeates well into the pockets around the teeth. After the use of tooth brush, a camel's hair pencil brush may be used to advantage in applying the acid around the teeth. There need not be any timidity in the use of sulphuric acid on the teeth and gums if properly diluted. No harm can or will arise from use of it. Some cry out against it, but it is from ignorance and want

of experience in the use of the article. A very prominent member of the profession in the city of New York proclaims for aromatic sulphuric acid, and has gone so far as to say the aromatic properties possess the merit for cure, or words to that amount. I have tried it faithfully and failed of best results, and so will any one. The pure sulphuric acid, properly diluted, is best. Experience is our best teacher. Faithfully experiment and hold fast to that which proves best is a conservative and safe line for practice.

After the application of acid I forbid the use of water for rinsing the mouth for some minutes, as I desire the acid to have full effect upon the gums and particles of deposits dislodged, and possibly some small points still adherent to the teeth. I then apply finger pressure to the gums and press firmly to the teeth, and instruct patients to do likewise several times daily, for several days, immediately after using brush, the same that I used in applying the remedy, it being better suited to the condition of teeth and gums than the majority of tooth brushes on the market. I advise the free use of the brush daily, two or three times a day, directly following treatment to keep th margins of the gums irritated and to produce or invite healthy granulation; also to prevent the accumulation of foreign matter on the teeth below the margin of the gum. For several days after treatment the gums may bleed on application of brush, but, all the better, it is desirable. I urgently request finger pressure to follow use of brush; it promotes absorption and flattens and hardens the gum. The effect must be witnessed to be rightly appreciated.

On the second or third day after removing deposits, I make a careful inspection to see if any points of deposit have been overlooked; and if any are found, I am careful to remove it. This is a very important feature in the treatment and should never be neglected. I have for some months past followed the treatment, after rinsing of mouth, with a free application of *campho-phenique* (full strength) to

the gums with favorable effect. I can't say that I think it aids cure, but it seems to abate acute sensation and is unquestionably very soothing to the gums. Patients like the application and frequently ask for reapplication of it before leaving the chair.

In a large majority of cases a cure can be effected in from five to ten days if instructions are rightly carried out.

In regard to treatment for sanguinary deposits, the important and first step is to get at and remove, if possible, the deposit, all of it. In the event the deposit is so located that you can't get at it with instruments (such cases do present now and then) then remove the tooth and get rid of the trouble; it is best for the patient. I have frequently persisted in treatment for months, then had to extract. After extraction no further treatment is necessary; the gum will soon assume healthy action.

As concerns treatment for gum waste or recession of the gums, I do not feel authorized from experience to suggest treatment, for I can't say that I have ever had definite evidence of having checked progress of the disease by any line of treatment pursued. I sometimes advise the use of a mouth wash composed of pure apple cider vinegar, one part; Jamaica rum, one part; strained honey, one part; and water, four parts. To be used as follows: take about a desert or tablespoonful into the mouth once or twice daily and apply brush forcibly, especially on parts most affected. The same wash and practice is sometimes requisite, as after treatment in some cases of pyorrhea, particularly when the gums need stimulating and toning up, mostly with persons of advanced years.

It is important in the treatment of any disease to be careful not to try to do too much. Over treatment is often worse for a patient than no treatment.

A tooth brush for daily use and to be effective should be shorter and narrower than the majority of brushes on the market, and the rows of bristles should be few and far apart, not more than three or four rows crosswise the

brush with space between rows, from a quarter to three eights of an inch. A compact close bristle brush is objectionable and ordinarily will do more harm than good to the gums, and in no way benefit the teeth. The object of a brush is to cleanse the teeth, every division of them above gum margin, if possible; hence the necessity for much space between rows of bristles.

In this paper I have endeavored to make a plain statement of facts in relation to my treatment of pyorrhea, pyorrhea alveolaris, Riggs' disease, scurvy, or whatever it may be termed, and kindred diseases, with a desire that others in the profession may be induced to treat the same as I have been doing for many years with good results and satisfaction to myself and patients.

The thousand and one remedies written about and proposed for treatment of pyorrhea alveolaris I have never realized any necessity for, with those I have experimented with I have found inefficient, and with them failed to accomplish best results; therefore persevere in the use of my long tried and effective remedy, *sulphuric acid*, regarding it harmless and reliable and more certain of effecting desired results than any or all other remedies.

ARTICLE II.

THE APPLICATION OF MASSAGE IN THE TREATMENT OF DENTAL PATHOLOGICAL CONDITIONS.

BY W. F. REHFUSS, D. D. S.

Continued from page 455.

What constitutes the doseage of massage is to be determined by the force and frequency of the manipulations, and the length of time during which they are employed.

As the success of the treatment depends upon experience, it is logical to suppose that an expert manipulator, working diligently and with judgment will accomplish more than one who is inexperienced in the methods. The number of manipulations average about sixty per minute. I work from two to fifteen minutes, according to the object which I wish to accomplish. In ordinary pericementitis I would require about eight minutes. Formerly, I manipulated the gum only on the one side of the tooth next to the cheek or lip; now I use massage on the gum on both sides of the tooth, the labial or the buccal, and palatine or lingual. The efficacy of the treatment is thus increased.

The importance of extreme caution and gentleness is not to be overrated, for therein lies the success. Question the patient frequently and learn if the manipulating causes pain, and regulate the intensity accordingly. If the manipulator used undue strength upon such a sensitive tissue as the oral mucous membrane, he would injure rather than benefit the part.

I will now consider the physiological effects of massage: gentle stroking, though soothing, is, in a physiological sense, a mild irritant to the superficial vessels. It causes a narrowing of their calibre and a stronger and swifter current in them, because of its stimulating influence on their muscular coats and vaso-motor nerves. By *effleurage* we increase the circulation in the blood-vessels and lymphatics, by reason of the mild irritation produced, which attracts the circulation to the part. When we apply the friction we squeeze the pathologically changed parts, and by carrying the diseased tissue into the healthy substances, exposing them to firm stroking, the products of inflammation are absorbed. By *tapotement* or percussion we cause an influx of blood to the superficial vessels and remove the stasis in the current, invigorating the parts.

Massage exerts a simultaneous influence upon all the tissues within its reach,—the blood vessels, lymphatics,

nerves, etc. It causes a more rapid absorption of the products of waste, stimulates and hastens the sluggish circulation. The mechanical effect of centripetal stroking is to push along the circulation, and the collapsing vessels cause a suction power that aids the returning current. When we use pressure in stroking, we crowd and squeeze the tissues together, impeding, in a measure, the outgoing or arterial circulation in the part thus treated, because of the contraction caused by this pressure of the tissues upon them. Naturally an accumulation of blood takes place, and on removing this pressure, the increased volume of blood owing to its sudden liberation rushes onward with greater force into the partially emptied continuance of the arteries.

In heat and cold we have two valuable remedial agents. Providing other and more convenient methods of application were available, more therapeutic benefit could be derived from their use than is now accorded to them. When we apply moderate heat to a tissue, it causes a flow of blood to the part and dilates the blood-vessels bringing the blood, as well as those returning it. If of a high temperature it acts like cold, causing a contraction of the vessels, counteracting vaso-motor paralysis. Therefore, the theory in the application of heat, to gain the desired therapeutic effect, is to apply it of a moderate temperature, say 90° Far., and gradually increase the temperature. This is but the same principle as massage, for the intermittent momentary compression of massage causes a mechanical contraction and dilatation of the blood vessels, arterial, capillary, and venous, at every application, from sixty times a minute upwards, which is certainly sixty times oftener than could be produced by the variations of the caloric in the same time. Moreover, the aid to the returning circulation, by being pushed along by massage is greater than that produced by heat, which has a tendency to enlarge the area of stasis, while on the other hand, the pressure of massage over the effusions and exudations dis-

perses them and remove the stasis. When we apply cold to an inflamed tissue we can reduce the pain and swelling, but instead of increasing the circulation and hastening the retaining current of blood as by massage, the current is lessened and the effused products are not easily absorbed because of this contraction of the vessels. Again, cold applications to the oral mucous membrane are not without their dangers, as they may suspend nutritive action and convert inflammation into gangrene, or cause sloughing.

The dental pathological conditions for which massage is applied, and the different stages when it is beneficial, will now be considered. According to the requirements of each individual case, massage may be of primary or secondary importance, of no use at all, or even injurious. As to the range of its usefulness, experience and observation have shown me that it is beneficial in local disturbances of the circulation and nutrition, either in their incipient stages or after the acute symptoms have passed away; in acute and chronic forms of periostitis, gingivitis, alveolar abscesses and neuralgias. Local congestions and irritation can be relieved by massage. In diseases of the peridental membrane the treatment depends upon the nature of the inflammation. The objective point in its incipient stages is to abate the swelling, disseminate the products of inflammation, remove the stasis in the circulation and restore it to its normal condition. To be effective, the treatment must be both tonic and sedative in its effects, and must be capable of promoting the absorption of serous effusions, and causing the nutrition to be raised to a normal standard.

In these cases the massage at first should be gentle, as a counter-irritant effect is desired to bring the blood in the superficial vessels into more active circulation, so that when such remedies as tincture of aconite, tincture of iodine, chloroform, etc., are applied to the gum, they are more easily absorbed. It is my usual practice to manipulate the gum before applying to it any remedy, because the

blood supply is increased, insuring the absorption of more medicine than ordinarily. When I use massage in the treatment of periostitis, I do not resort to lancing, unless considerable local congestion is present, when it is advisable to use massage first, which increases the blood-supply and also removes stasis, so that when the gum is lanced the consequent flow of blood is greater and continues longer than usual. This is an advantage, because the flow of blood from a cut by the lance is not always sufficient to relieve the congestion.

When the tendency of the inflammation is towards the formation of pus we can, by vigorous and repeated massage, hasten it and cause an earlier discharge. Massage softens the tissues, and by reason of the heat created, tends to direct the pointing of the abscesses. In acute alveolar abscesses massage is beneficial after the discharge of pus has ceased and the healing process commenced. The prognosis is more rapid than when massage is not employed. It stimulates and attracts blood to the part, causing the products of waste to be absorbed and disseminated, and induces the formation of new granulations.

In some chronic alveolar abscesses remedies seem useless. In several of these cases, by massage I have aroused the languid circulation and caused the absorption of the products of waste. In the class of cases under consideration we have a sinus present and a continued discharge of pus. It is a passive condition. The tissue outside the boundary of pus is torpid. If we allow the granulations to remain in this condition they may contract and consolidate in time, causing a closure of the sinus but clinical experience demonstrates that the tendency is to take on a retrograde action and involve the surrounding tissues and alveolar process. We must take advantage of this passive or languid stage and cause a formation of new granulations. Massage fulfills the requirements of these cases. Antiseptic injections should in addition be used and the prognosis will be more favorable than ordinarily.

Frequently we have complaints from patients that in teeth which have been abscessed, but that are apparently cured, the sinus having closed and the discharge of pus ceased, there is a sense of tenderness and soreness when the finger is pressed over the root of the tooth. I have noted that this trouble occurs particularly in bicuspid teeth. In a number of cases of this kind, I have by massage entirely removed such soreness.

The etiology of neuralgia is an important factor in its successful treatment by massage. In the incipient and milder forms it is particularly beneficial. Neuralgias, whose origin can be traced to local irritations, climate changes, irritations and inflammation of the superficial vessels, yield more readily to massage than any other local treatment. When used between the paroxysms of facial neuralgia, it lengthens the intervals between them and the attacks reoccur with less severity. In neuralgia in nerves not too deeply seated, I consider massage an excellent remedy; otherwise I depend on internal medication. In the earlier stages it acts as a prophylactic, relieving congestion by causing a free circulation in the surrounding tissues. In severe neuralgias of the fifth pair of cranial nerves, it is the custom to resort to the surgical method of exposing the nerve and stretching or dividing it. Stretching has become the most acceptable remedy; the object is to relieve the tension and pressure of the nerve. As these methods do not always assure relief, I believe massage should be thoroughly applied and tested before resorting to such severe operations. The action of massage is similar to nerve stretching. In the stretching operation the nerve is released from the neighboring tissues which compress it, which lessens its irritability and changes the structure and circulation. Massage makes mild stretchings in the same manner, and might succeed where violent ones would fail.

In diseases of the dental pulp, I do not advise the use of massage recognizing that we have remedies that are

infallible. However, if periostitis is associated with the pulpitis the manipulations will be beneficial.

I also advise the use of massage to allay inflammation and pain incident to infantile or first dentition.

In conclusion, my employment of massage during the past eighteen months, in over two hundred and fifty cases of various kinds of dental diseases, and with more than average successful results, certainly justifies me in presenting and advocating its therapeutic merits to the dental profession.—*Dental Mirror.*

ARTICLE III.

A REVIEW OF COPPER AMALGAM.

JULIEN W. RUSSELL, M. D. S., BROOKLYN, N. Y.

[Read before the Union Meeting in Boston, October 29, 1890.]

Probably never, in the history of the profession, has there been so much controversy excited in regard to the merits of a preparation, as in the case of copper amalgam.

It has been denounced by some as entirely unfit to be placed in the oral cavity; and upheld by others as the only filling material to use.

Tests have been made proving that it is affected by the oral secretions, and in time wastes away so as to render the filling useless. Equally reliable tests have proved that it is probably the most perfect filling material that has ever been invented.

These apparently contrary results have been obtained by men of equal ability and discernment, whose opinions have always been regarded as final. Later on we will try to prove that these conclusions are not quite as antagonistic as they appear.

It is now about three years since copper amalgam first became widely known in the United States, although it has been used abroad for over fifty years.

The sudden abandonment of alloys in favor of copper amalgam, and the enormous amount used for a while, is only another instance of the tendency of certain members of the profession to blindly adopt a new theory or remedy without thoroughly testing its merits. Consequently, while a method or material may be beneficial for certain cases under certain conditions, they immediately conclude that it is a panacea, and use it indiscriminately. The inevitable result is that there are necessarily many failures to record; and with that soundness of judgment and wideness of vision, for which the members of the dental profession are noted, these enthusiasts suddenly proclaim, that the theory or material is worthless, and condemn it as strongly as they formerly upheld it.

In order to arrive at definite conclusions, I entered into correspondence with dentists in different sections of the country, and taking the records of their experiments, I have compared them with some made by myself. The result I have the honor to present to you to-day.

Fault has been found with copper amalgam for many reasons; its opponents claim that it possesses no antiseptic properties; that in certain mouths it is soluble, and that not only do the detached particles discolor the adjoining teeth, but also there is great danger of constitutional derangements being produced from their absorption. In some persons very susceptible to the influences of mercury, salivation may result from its use, and in others copper poisoning.

It is said that the absorption of these minute particles of amalgam into the system would counteract the effects of drugs administered for diseases; and in throat and stomachic troubles would not only accelerate the disease, but so antagonize the relieving remedies that a cure would be im-

possible so long as the fillings remained in the mouth.

It is also claimed that copper amalgam will shrink, allowing moisture to penetrate between the filling and the walls of the cavity, resulting in a deep discoloration of the tooth.

Then, again, there is said to be a great wasting away at the cervical wall, *some* declaring that in a few months the filling becomes so thorougly softened at this point as to allow of its being removed with but little effort, and that when replaced the process is repeated in a very short time.

In favor of copper amalgam, it may be stated that a large number of tests, under all manner of conditions, have fully proven that it does not shrink to any appreciable extent.

In a steel mould one inch square and one-half an inch deep with absolutely vertical walls, a layer of copper amalgam one-eighth of an inch was carefully packed. After setting it was placed in aniline dye for a few days. When separated no traces of leakage were perceptible, and though the experiment was often repeated, the only signs of leakage found were when the amalgam had been used too dry, a thoroughly homogeneous mass not having been secured; and again, when the amalgam was so soft that it curled away from the walls.

The results of these experiments have been confirmed by some made in England, where the shrinkage was tested by a micrometer and found imperceptible when the amalgam was mixed to a medium consistency.

The discoloration of tooth structure may result from any one of the following causes:

The first is poor manipulation, which results in a leaky filling, as illustrated above.

The second is the teeth of poor structure are permeable by moisture, resulting in oxidation of the fillings, and this is not nearly so great as in the former case, and is much to be

desired, as the oxide of copper hardens the tooth substance.

The third cause of discoloration is an impure material. A large number of the amalgams are made by precipitating the copper by means of zinc or iron; and, according to Dr. Mitchell of London, these form double sulphides which will blacken any tooth structure with which they come in contact. Take a hard dense tooth with a pure material, a careful insertion of the filling, and I doubt if any discoloration will be found.

The wasting away of carefully inserted fillings is certainly very discouraging, and especially so when a large crown filling is found hollowed out after a few months' use. The cause is generally to be found in an unusual acid condition of the saliva, and the only remedy is to cover the filling over with gold or an alloy.

In cases where the cervical part only is softened, it will be noticed that the teeth are afflicted by the peculiar erosion along the gum margins caused, as it is supposed, by acid mucus; in fact I have never heard of a case where this was not present. One thing is certain no wasting away has ever been found when the secretions were alkaline or neutral.

The theory that the dissolved particles affect the system, is very difficult to substantiate. The quantity that each day enters the system is so infinitesimal, and the question as to whether it is absorbed or passes through the system unchanged, is so unsettled, that no one can speak definitely on this point until we can obtain more accurate reports. I do not think that this objection need have any weight.

Everyone who has success with copper amalgam makes this statement: "It must be used with judgment, and more care is required than with alloys, not only in the manipulation of the material, but in inserting the filling.

To secure the best results from the use of copper amalgam, it should be remembered that its true position as a tooth saver is not in competition with gold, alloy or cement, but it has a place by itself, and that is where experience has shown the majority of other fillings have failed.

On the buccal surfaces and in large approximal cavities of

the molars, especially where they extend under the margin of the gum. For cavities beyond the reach of the tooth-brush, and as a lining for very frail teeth, it is unsurpassed; and finally for preserving the deciduous and six-year molars in the mouths of children. This is the true position of copper amalgam.

Its manipulation is very simple: heat it slightly, grind vigorously; for the more it is ground the better; when amalgamated, squeeze out any surplus mercury until the mass is of the consistency of an ordinary alloy. In inserting the filling use small pieces, and burnish them from the centre to the sides of the cavity; when filled smooth the surface very gently and do not use the burnisher too much but draw it lightly from the center to the edge of the cavity; then allow it to harden, and finish in the usual manner.

In compound fillings of gold and copper amalgam, the method of adding the gold while the amalgam is still soft, is *not* to be commended; for the mercury that amalgamates with the gold does it at the expense of the copper; this part of the filling is apt to be porous, and in addition the close combination is likely to cause electric shocks. A better plan is to insert the amalgam and cover it with a temporary filling until it hardens; then cut the retaining points in the amalgam and complete with gold. Such a filling, when polished, presents a close line of union, and will preserve the tooth far better than when inserted as before described. If the moisture is thoroughly removed from the cavity that contains a certain amount of decayed tissue, and the amalgam placed over it, in time it will be found that decay is still progressing; but if a small quantity of moisture is left in the cavity, oxide of copper is found, and on account of its great antiseptic properties, further decay is prevented.

This is decidedly the best method for preserving the deciduous teeth; the only objection, darkening of the teeth, being of little consequence. Teeth filled in this manner three years ago, are still perfect, and from all appearances, will last as long as they are needed.

I have carefully tried to mark out the lines by which success with copper amalgam can be achieved. It does not offer

any reward for poor workmanship, but on the contrary, requires the highest skill and judgment to obtain the best results. The future for it in this country is very great, and in time it will be recognized as one of our most valuable materials with which to preserve the teeth.—*Dental Mirror.*

ARTICLE IV.

BROKEN INSTRUMENTS IN ROOT CANALS.

BY WM. CONRAD, D. D. S., ST. LOUIS.

Read before the St. Louis Dental Society, St. Louis, March 3d, 1891.

How to remove them, is a question often asked at dental meetings with never a satisfactory answer to the query. Judging from my own experience, there is no set rule by which we can act; circumstances must suggest the method we are to follow in these difficult cases. We are never certain as to the degree of success we will have, and for this reason it should be our endeavor to avoid everything that will leave the case in a worse condition than it was when we commenced to work.

When this subject was first given to me I had hoped to be able to present something of practical value, but the more I tried to solve the problem, the more difficult became the subject, and as a result, I have only a few general ideas to offer for your consideration to-night. It will be rather to tell you to avoid these accidents, than to enlighten you on the point as to how to remove them when you have the instrument in the canal.

In operating upon pulpless teeth, the best thing to do in order to insure your future comfort, is not to break the instrument off; but this would be out of all human power, as such things have happened and will happen again to the

most careful of dentists, although at the time of such accidents the feeling is that carelessness has been the cause of our misfortunes.

A dentist, who says he never breaks instruments in root canals, must be one who never treats and fills pulpless teeth. I believe there are some such people still alive, although their numbers are not so numerous as formerly. A boast of this kind can never raise the reputation of the operator in the estimation of the large class of progressive dentists who are every day trying to do their best for those who trust their ability to save the natural teeth.

I must be in the position of one who has not the requisite amount of skill to properly handle instruments, as I have broken quite a number of them in roots during my years of practice.

The kind of broaches to use in order to get the best results, is an important consideration, and not as easily answered as might at first be imagined. The individual preferences of the different dentists must be the guide to a proper selection.

For general use, I prefer the Jeweler's Swiss broach, Nos. 6-8, temper drawn to a spring, at the time of using, dressing the surface with an emery disc and burnishing with pliers. This gives a smooth, flexible instrument now ready for use. Sometimes I have to sharpen the point for difficult work.

Gold, platinum, gold and platinum, etc., have been recommended as materials for broaches, but I cannot see any advantage in their use over the steel instruments. They will break as readily as steel, and as it is not from the corroding of the piece left in the canal that we have the most to fear, we can gain nothing by their use. It is from a blocking up of the canal in such a way that the root cannot be properly treated and filled, or by forcing the point through the apical foramen, that we expeet the greatest danger.

How to use them is a subject for our constant study, and something we all think we know until an accident happens, then we begin to invent excuses for our lack of knowledge. Never use a broach many times. If a new one is selected for each case it might save us hours of annoyance, and perhaps some professional credit. Of course we use a new one every time the case seems to demand it, but to our sorrow this is not enough. Give up the old one, no matter how well it may be adapted for the work on hand, before we are compelled to make a change from necessity. Care in this one particular will save us trouble.

Never twist a broach in a canal; although we may be sorely tempted so to do, we are likely to twist once too often. There are more barbed broaches left in roots than all other instruments combined. I am glad to learn that their use is going out of style, and I hope they may never become a necessity again.

From my observation, the greatest number of dentists make use of mechanical means to get the pieces out of the canals. This method is all very well, if we succeed, but in case we do not accomplish our object, it leaves the case in a much worse condition than if we had never made the attempt. If the effort at removal has not been successful the broken instrument has been forced more firmly into the canal, leaving a space beyond which cannot be treated or filled, setting up a low form of inflammation, and being always a constant reminder that abscess is liable to follow, unless the end of the root becomes encysted, and to my mind a permanent case of this kind of relief is rare, and not to be relied on for safety. If the instrument is forced through the apical foramen, this condition to me would mean the final loss of the tooth. In such cases as this, gold; platinum, gold and platinum broaches do not make a good root filling, as some of our brothers a few years ago stated as a reason for the use of other metals than steel in the manufacture of broaches.

The action of chemicals upon metals seems to me to be the ideal plan for solving this difficulty. Some acid which will dissolve the broken instrument, thus doing away with the necessity of disturbing it by any mechanical effort, and when it has been sufficiently softened, allowing us to wash out the remaining debris, would be, to my way of thinking, a blessing to dentists of to-day. How to do this is a question I would like to have answered. Such a chemical should act more rapidly upon the instrument than upon the tooth substance, and there will be the difficulty, as everything I have used requires a greater quantity in contact with the metal than we get there, or will act too rapidly upon the root.

Chemicals used for this purpose are numerous. None of them can be relied on at all times. Common salt has been recommended, but it will not do the work. Hydrogen di oxide pumped into the canal and around the piece, should do it, but will not. Bichloride of mercury, forced around the broach, does not seem to care for the task.

Sulphuric acid I have tried with fairly good results. It certainly will do no harm, and is worth a trial in case of necessity, as it softens calcified pulp matter and gives you more room to better treat the roots.

Nitric acid is one of the most certain means we have to use, although the danger in its use makes care a great necessity. I believe I can remove any steel instrument from a root by its use. I use it diluted, and the gold broach wrapped with cotton as my means of applying it. In some desperate cases I have taken advantage of it, and have not been sorry.

In conclusion, let me say, it is a misfortune that sometimes our patients will go visiting the other dentist, just when we would prefer all of their company ourselves, and it is a consolation for some of us to know that it is not always the most unskillful dentist who pushes the broach the furthermost through the apical foramen.

I certainly would not tell the patient the instrument was in the root; it will do no good, and many times may do harm, both to patient and dentist.

My advice would be to "*Keep it dark and do your best.*" We always lose money on such cases where the "other fellow" did not break the instrument, as it is hardly worth $12.00 per hour to the patient, our efforts to save our own reputation.—*Archives of Dentistry.*

ARTICLE V.

ADHESION OF SOFT PALATE TO PHARYNX; OPERATION; CURE.

BY HAL FOSTER, M. D., KANSAS CITY, MO.

Larynologist to All Saints' and Missouri Pacific R. R. Hospital.

Read before the Medical Society of the Missouri Valley, December, 1890.

The patient, a man 40 years old, by occupation a seaman, and a native of France, applied to me November, 1889, complaining of shortness of breath. He wanted to know if anything could be done to restore his speech. He was able to utter a sound, but he could not turn this sound into words.

He had contracted syphilis twenty years before. He was married, and his wife had miscarried three times. One child was born living, and is now twelve years of age, and apparently in fair health. This communication was made on paper, as the patient was unable to talk. His nose was entirely eaten away down to the nasal bones, so that all that remained was a small opening in the face. The nasal fossæ would fill up with large green crusts, which he dislodged with a hair-pin every morning and evening. The stench from these crusts was exceedingly offensive. I took out two, which were fully ten and a half inches in length,

and shell-like in form. The patient's mouth was so closed up by syphilitic adhesion that I could pass in my two fingers only with great difficulty, by stretching the mouth to its utmost capacity. A laryngoscopic view of the throat at this stage was impossible.

The first operation I undertook was enlargement of the mouth, which was done by means of a knife. Afterwards little wooden stretchers or gags were inserted, to prevent the wounded surfaces from growing together again. After this was accomplished, I found that the uvula and the lower part of the soft palate were entirely destroyed, and the remaining part of the palate was firmly adherent to the pharynx, so that the upper pharynx was completely separate from the lower pharynx. The complete occlusion of the two pharynges is extremely rare. I have met with it in only three cases. It is by no means rare in tertiary syphilis of the throat to find a partial adhesion of the parts; but it is extremely rare to find a complete adhesion. Often a small opening can be discovered, sometimes only large enough to admit a small probe, but still large enough to admit a small current of air.

In this case I covered the lower pharynx with iodoform and filled the nasal fossæ with water. My iodoform was not moistened.

I now determined to liberate the palate from the pharynx, so that I could give my patient nasal breathing, and also give the nasal cavity an outlet into the throat. I first passed a silver probe down through the nose to the pharynx, and with a tenotomy knife cut where the palate bellied. After I had thoroughly separated the palate from its attachment, with no little difficulty, the parts were sprayed with a solution of tannin. No anæsthetic of any kind was used. I now began to pass the largest sound I could obtain through the opening into the pharynx. I afterwards had a sound made after the following description. The body of the instrument was about two inches

n length, and it was blunt-pointed at the end, and gradually as it reached the base, it was somewhat similar to a triangle in shape. The base was an inch and a half in width. To the broad end of the instrument was attached a long handle, so that it could be manipulated in the throat. I found that with this instrument I could keep the opening the required size and prevent it from closing. Had the wound not been treated with sounds after cutting, the opening would have filled up in a very short time.

This is a peculiar characteristic of syphilitic tissue, where we seek to enlarge an opening, whether it be in the pharynx or nasal fossæ. In a case of nasal stenosis now under observation, I have seen the parts close completely after opening the nasal canal three times, every time giving the patient complete breathing space, taking out at each operation a large piece of cartilage at the point of union. In a short time the parts were firmly adherent again.

The parts in this operation healed nicely, and within four days absolutely no pain was felt from the passage of the instrument. An examination of the larynx showed complete paralysis of the abductors of the vocal cords, and the whole mucous membrane lining the larynx was in a state of hyperemia. This accounted for the loss of voice. At the beginning of my operations, I had placed my patient under iodide of potassium; but I was compelled to give him 90 grains, three times a day, before I could produce any effect. I do not consider this an unusually large dose in cases of tertiary syphilis of the throat and nose, and have often given larger doses and maintained them during a longer time. This was given in Vichy water; his stomach stood it nicely, and I kept this amount up for two weeks, when it was gradually reduced. Later I gave him only tonic doses. Within a month and a half from the time of the first operation on the mouth, the patient had entirely regained his voice, and had gained something like fifteen pounds in weight. His voice was now quite clear and strong. I had an artificial nose made for him by

Tiemann & Co., while I was attending the Manhattan Throat Hospital of New York last August, which supplied his missing member very well. I gave him one of the sounds above described, and told him to use it once or twice a week for a year. I often hear from him, and he reports the breathing through his artificial member excellent, and his voice good.—*Med. and Surg. Reporter.*

ARTICLE VI.

SOME PRACTICAL SUGGESTIONS ABOUT PLASTER OF PARIS.

BY RODRIGUES OTTOLENGUI.

The columns of our journals are more often given up to operative dentistry, or to theoretical discussions of supposed to be scientific matters, than to the every-day needs of the worker at the laboratory bench. We visit our neighbor, and he takes us cheerfully into his office, but infrequently invites us into his workshop—perhaps because it is dirty. Thus by association we learn more about each other's methods at the chair than we do of what we once called mechanical dentistry, which nowadays is too often relegated to inexperienced students or assistants. Whatever I do for my patients, I do with my own hands. Every dentist should be able to say the same, or at least to do the same. If anything presents which my hands could not accomplish, I do not hesitate to recommend my patient to the proper specialist, rather than to hire said specialist to come in and do the work surreptitiously, taking the credit myself. But this is not practical talk, which my title promises.

In Philadelphia once, I heard Prof. Esig say that he doubted if there were more than five men in Philadelphia who knew how to mix plaster. A sweeping assertion, which was however probably correct. Though at the moment in that

city, I could not at that time have contended for a place among the learned five. What I know on the subject now is due to my association with Dr. Kingsley, who perhaps has no superior in the manipulation of this material.

First, then, for a few facts: Plaster will set more rapidly if tepid (not hot) water is used, than if we take cold. A clean smooth cup is the most convenient vehicle in which to mix plaster, rubber bowls being especially unsatisfactory to one who has become accustomed to the thin cup. New cups should be obtained as often as the surfaces become checked so that the plaster is difficult to remove. If an excess of material has been used, scrape it out into the waste box, and what little there is left in the cup will easily come away when hard, by filling the cup with water.

To mix plaster, put in the cup at the outset about as much water as judgment indicates will be needed. To add water later is a mistake. Drop in the plaster a little at a time, allowing it to disappear below the surface before adding any more; repeat this till the plaster protrudes above the water, which refuses to take up any more. Then stir vigorously with a smooth *clean* knife and a mixture moderately stiff, and perfectly smooth will reward you. The more it is stirred the more quickly it will set, and the stiffer it gets. Use it for the purpose in hand when it has reached the required consistency. If on mixing it is found that a miscalculation has been made as the mass is thin, do not add more plaster; such a step will ruin everything. Pour off any excess of water, and then stir till stiffening begins. Mix enough plaster at the outset, because to mix a second batch, especially in flasking, gives a mass one part of which will set sooner than the other, which is often very undesirable. In taking an impression of a large surface, this sometimes becomes necessary. Then mix the first batch quite thin and flow it over the entire surface of the object of which a duplicate is desired. Then add other plaster until the impression is as thick as needed. By the time the last lot has set, the first will usually be hard, and all will be well.

In mixing for impressions of the mouth, use fine plaster, add a little salt and a little powdered pigment; Venetian red

or Spanish brown serve admirably. This will produce a thick setting tinted impression material, which can be readily detected from the model which is to be poured into it. The plaster must be mixed as described, care being taken not to have it too thick. Do not stir until in the presence of the patient.

Then stir until it can be felt that the mass has begun to stiffen. Fill the cup rapidly, carry it to place firmly and hold it there motionless. If there is a high roof put some plaster in the valut with the knife. If it is feared that the buccal portions of the molar teeth may not be reached, place plaster there also, before inserting the tray. As soon as the plaster begins to set in the cup, chop it up so that it may be more readily removed when the cup is to be cleaned. As soon as the material in the cup will fracture sharply, remove the impression regardless of possible fracturing. If this does occur, collect all the pieces from the mouth; they may be replaced so as to form a practically perfect model. I have made up an impression from thirty odd pieces and secured good adaptation.

To procure a lower impression, put but little plaster in the tray, place plaster around the teeth in the mouth with the knife, being sure to cover all surfaces of the teeth; then quickly insert the tray and let the mass harden, and remove as before. In very difficult cases, where the teeth are long and perhaps loose, dispense with the tray altogether. When the material is sufficiently set, split it into sections with a sharp pen-knife, and afterwards join the fractured pieces together as before.

To pour a model, use a shaving brush, and with soap-lather, thoroughly soap the surface of the impression, especially in the pits for the teeth, and be careful to wash all the suds off afterward; otherwise the surface of the model will be pitted. Mix the plaster moderately thin. Have the surface of the impression saturated, and a little water in the pits for the teeth. Start the plaster into the last molar and let it fill up and run over into the other pits, forcing out the water ahead of it until all are filled. Then turn the impression over and shake the plaster out of the impression back into the cup. This insures a thin film of plaster over the entire surface. If the process is

now repeated and the impression slowly built up without turning it over, the result will be a most accurate model.

Where the model is to be used for gold work, and dies must be made, if there are any teeth present, a pin should be placed in each. In doing this cut the heads off, and later the plaster teeth may all be broken off, the pins withdrawn, the dies made. and the teeth readily returned to position, where they may be again fastened by using a camel's-hair brush and plaster very thin. In repairing models in this way, take a saucer with a little water and drop in a little plaster, but do not stir it. The plaster may be taken up with the brush placed along the joint between tooth and model, and as it soaks in the excess must be wiped away with the brush filled with water.

When it becomes desirable to trim a model, after it has lain around a day or two, and so become quite hard, dip it in water for a few minutes, and it may be readily cut with a sharp pen-knife. If an impression is filled and allowed to stand over night, drop it into hot water, and the steam generated will make separation more easy. Models should always be well soaked before more plaster is added to them. If, however, it is desired to preserve a model, upon which a plate is to be vulcanized, it may be readily done by soaping it slightly and flasking it as dry as possible. With care, after vulcanization, the investment may be removed without injury to the model, which, if then allowed to dry, may be separated from the plate.

To mix plaster and sand for investment of gold pieces, drop sand into water, and without stirring pour off as much water as will run out. If now half the quantity of plaster be added, vigorous stirring will produce a mass of the proper consistency. At first it will appear stiff, but by stirring the sand will soon yield enough water to saturate the plaster, when the whole will become incorporated.

Never varnish plaster under any circumstances, except for moulding in sand.—*Dental Mirror.*

ARTICLE VII.

THE DENTAL PULP.

BY W. XAVIER SUDDUTH, A. M., M. D., D. D. S.,

Professor of Pathology and Oral Surgery in the University of Minnesota.

Objection has been raised against the use of the term dental pulp, some holding that the formative organ of the dentine should be called the dental nerve, as it is even now designated by the laity, because of the fact that when in an inflamed condition it is extremely sensitive.

Considered from the stand-point of histology and compared with other portions of the body, we find that it is much less highly organized and presents few of the special characteristics which entitle it to classification as nervous tissue. The greater portion of the mature pulp is composed of ordinary connective-tissue elements, being made up of filiform and fusiform cells, presenting no regularity in arrangement, but crossing and anastomosing in all directions.

Upon the surface of the pulp, forming part of it, is a layer of cells termed odontoblasts. They are developed from the ordinary embryonic connective tissue cells, but are especially endowed with the function of secreting the dentine. These cells are possessed of one or more fibrous prolongations which extend into the tubuli of the dentine. To these fibers of the odontoblast has been given the name of dentinal fibers because of their location.

The pulp is a very vascular organ. Its blood-supply consists of a few vessels of considerable size and numerous capillaries, which ramify throughout the entire organ.

It is also well supplied with nerve-elements. These consist of medullated and non-medullated nerve-fibers, which terminate in the odontoblastic layer. They do not, however, present the same fineness of subdivision as is found in the terminal nerve fibers of the cornea.

Some writers hold that the sensitivity of inflamed dentine

in decay indicates the presence of nerve-fibers in the dentinal tubuli. Such is not necessarily an absolute deduction, as an inherent property of protoplasm is the power of conducting sensation, which latter is not confined to nerve-fiber alone. It is also well known that in inflammation this property is highly exalted. The term sensitive dentine is a misnomer, as the sensation is confined to the dentinal fibrillæ, and the degree of sensitivity is in the inverse ratio to the attenuation of the fiber; hence the most sensitive point is found at the union of the enamel and dentine, where the fibers reach the finest subdivision. The more delicate the filament the more exalted its power of transmitting sensation, and inflamed dentine does not present any distinctive features not exemplified in other portions of the body under similar inflammatory conditions.

The most common conditions of inflammation that dentists come in contact with are pulpitis and periodontitis. They are not, as a rule, called upon to treat inflammations in other portions of the body, consequently are but little acquainted with inflammation in its general aspect. There are several places where inflammation is even more intense and painful than it is in the pulp. The eye is a most notable example, also the ear and the organs of generation, not to speak of the central nervous system.

Periodontitis is allied to inflammation in the periosteum, and differs in no whit from such processes wherever found in connection with the osseous system, and is always very painful. It appears to be the tendency of dentists to magnify the intensity of the conditions they are called upon to treat, largely, as we have intimated, because of their limited acquaintance with the processes of inflammation in general, while the tendency among physicians is to minimize the conditions because of their lack of knowledge of the special conditions found in the mouth.

It is not our intention to displace the dental pulp from the list of sensitive tissues when inflamed, because it does not differ from other tissues under similar conditions, but to compare it with other tissues in order to impress upon the mind the need of greater care in manipulation. Dentists, as a rule, when judged from the stand-point of delicacy of touch and

carefulness in manipulation, make a very poor showing when compared with ophthalmologists.

An indifference to expressions of pain seems to grow upon some dental practitioners as practice increases, and they find themselves growing less appreciative of the niceties of practice which gained for them their reputation as careful operators. If the above stricture is true, and we firmly believe it is, then the reputation of the dental pulp to be the most sensitive organ of the body is largely due to our carelessness as operators.

Before dentistry was known, the favorite expression for a condition of extreme sensitivity was "as tender as the apple of the eye," but now, thanks to an extended acquaintance with the operating chair, the more modern phrase, "as tender as the nerve of a tooth," has been introduced. This comparison is not intended to be invidious, nor to build up one specialty at the expense of another. It is well, however, at times, to see ourselves as others see us. Let us see to it in the future that the incubus is removed from our shoulders, and the "apple of the eye" restored to its former position as the most fitting term of comparison for extreme sensitivity.—*Cosmos.*

Communications.

MISSOURI DENTAL COLLEGE.

Editor of the American Journal of Dental Science:

The twenty-fifth annual commencement took place at Memorial Hall, St. Louis, Mo., March 12, 1891.

Prof. H. H. Mudd, Dean, addressed the graduates as follows:

Gentlemen, graduates of the Missouri Dental College:—You have much reason to be proud of your department of medicine. Special training has brought it to its present high position. So great has been the appreciation of this

skill that it alone has commanded respect and deference. It is one of the best of the results of the modern idea in educational pursuits. The limitation of educational effort to lines of practical application. So successful has been this special training that the dental profession seemed for a time inclined to accept as a practical fact that the narrow limits put upon a man by such training was an advantage. The liberal culture of the more eminent men in your department, however, recognized the great danger of modern educational methods in perfecting certain faculties at the expense of the general development of the individual. They saw that the dentist should not be merely a mechanic, but that he must be a man something more than a skilled workman. The individual should predominate over his profession. The man must be greater than his work, and the gentlemen who organized the Missouri Dental College fortunately appreciated the value of anatomy, chemistry and physiology in the education of a dentist. They recognized the danger of the modern tendency to specialism in the education of the individual. They knew that if a man was fitted into a groove, no matter how perfectly he filled the position, that his horizon was narrowed, and that he become dwarfed in body and limited in mental activity. A liberal education broadens the view, multiplies the avenues of growth, and helps to perfect the individual. Individual greatness exalts all mankind. Fortunately we have grand models—Divine and human—as examples. Strive for perfection, for your individual responsility; you are part of a stupendous whole, an atom among millions. You attract and repel, you influence and are influenced by others, and your life belongs not only to you and to your family, but to the world and the age. Be careful, then, lest now, in the period of activity, you do violence to the better sentiments of your youth and embitter the memories of the later years of life; for the record of time is surely written in your heart. The gaint tree of the forest has inner circles of growth that mark the rolling years. So you will find,

as advancing years dull your perceptions and whiten your locks, that your play and your work have fashioned that inner life into harmony with your daily thoughts and actions. Eminence, then, in special work should not entail loss of power in the individual, but should be the outcome of a liberal education combined with a special effort in a given direction.

You have the honor to enter the profession from a school which was the first one of the United States to recognize in a practical way the importance of the thorough education to be obtained by a union with an established medical college. With singular unanimity and in advance of the general profession; the department of dentistry has reached a high and liberal basis for educational qualifications, and now demands of all dental colleges an obligatory three years' course. This demand will be enforced throughout the country after the close of the present session.

I congratulate you upon your fellowship in medicine in the special department of dentistry. Accept this token, then, as evidence of your right and of the belief of the faculty of the Missouri Dental College in your capacity to work in the field of dentistry.

The degree of Doctor of Dental Surgery was conferred upon the following named gentlemen:

Edward L. Beatie, Higginsville, Mo.; Canute L. Brudewald, Beaver Falls, Penn.; Arthur C. Bedford, Bloomfield, Mo.; M. C. Boswell, Wright City, Mo.; James S. Coyle, St. Louis, Mo.; Marvin L. Cumming, Farmer City, Ills.; Charles E. Dungan, Springfield, Ills.; W. R. Eckle, Lexington, Mo.; James B. Harrison, New Albany, Ind.; George D. Kennedy, Colorado Springs, Colo.; James B. Newby, St. Louis, Mo.; John W. Markwell, Coryden, Ind.; John E. Masterson, Madisonville, Texas; Ruben G. Porter, Petoski, Mich.; Jasper DeG. Peak, Osage City, Kan.; A. S. Purdy, Carbondale, Ills.; William T. Rutledge, Monroe City, Mo.; George C. Schwarz, Edwards-

ville, Ills.; Samuel Schrantz, Warrenton, Mo.; Carl E. Schumacher, St. Louis, Mo.; Otto Settellen, Basle, Swltzerland; Herman Saxermeyer, Red Bud, Ills.; John H. Thiele, Hanover, Germany; H. G. Voorhies, Moberly, Mo.; J. Warren Wick, St. Louis, Mo.; James F. Wallace, Argola, Mo.; Matthew D. Wilson, Lexington, Mo.; P. H. Winans, Pittsfield, Ills.

Matriculates, 90.

Dr. W. N. Morrison, President of the St. Louis Dental Society, awarded the prizes.

"The St. Louis Dental Society Prize."—An elegant gold medal, to William T. Rutledge, D. D. S., receiving the highest vote on final examination.

"The J. W. Wick Prize."—Twenty-five dollars in gold, to George D. Kennedy, D. D. S., receiving next to the highest vote on final examination.

"The S. S. White Dental Manufacturing Company Prize."—A set of Varney Pluggers, to Ruben G. Porter, D. D. S., excelling in Operative Dentistry.

"St. Louis Dental Manufacturing Company Prize."—A Laboratory Lathe, to James F. Wallace, D. D. S., for the best specimen case of Artificial Teeth.

MISSOURI DENTAL COLLEGE ALUMNI.

The annual meeting of the Alumni Association of the Missouri Dental College was held March 12, 1891, at the College building, corner Seventh street and Clark avenue. Ten new members were elected to membership, including Drs. Newby and Wick, of this city, the others being members of the class of '91.

Officers for 1891 were elected as follows: President, Dr. W. M. Bartlett; Vice-President, Dr. J. H. Prothero; Secretaey, Dr. De Courcy Lindsley; Treasurer, Dr. Carl E. Schumacher; Executive Committee, Drs. Bowman, Prosser and Whipple.

During the past year the following alumni have been lost by death: Drs. Homer Judd, M. D. La Croix, John W. Forden and Henry D. Field. The following committee were appointed to draft suitable resolutions regarding the foregoing, to be presented at the next annual meeting: Drs. W. H. Eames, A. H. Fuller and John G. Harper. The by-laws were changed, doing away with annual dues.

ILLINOIS STATE DENTAL SOCIETY.

Editor of the American Journal of Dental Science:

The following program is arranged for the Illinois State Dental Society, to be held at Bloomington, May 12, 13, 14 and 15, 1891.

I. Annual Address by the President, Dr. Truman W. Brophy, of Chicago.

II. Report of Committee on Dental Science and Literature by Dr. J. D. Moody, of Mendota, chairman.

III. Report of Committee on Dental Art and Mechanism by Dr. W. B. Ames, of Chicago, Chairman.

IV. How to Deal with the Condemned Pulp, by Dr. J. G. Dickson, of Carme. Discussion to be opened by Dr. J. Y. Reid, of Chicago.

V. The Preparation of Teeth for Filling by Dr. Edmund Noyes, of Chicago. Discussion to be opened by Dr, George H. Cushing, of Chicago.

VI. Prosthetic Dentistry by Dr. W. T. Magill of Rock Island. Discussion to be opened by Dr. E. C. Stone, of Galesbury.

VII. Third Period in the History of Dentistry, continued with biographical notes, by Dr. John J. R. Patrick, of Belleville.

VIII. Experimental Studies on the Action of Diffusible Medicinal Agents in Living and Pulpless Teeth, by

Dr. A. W. Harlan, of Chicago. Discussion to be opened by Dr. P. J. Kester, of Chicago.

IX. Architecture of the First Upper Molar, by Dr. Alton H. Thompson, of Topeka, Kansas. Discussion to be opened by Dr. A. B. Fruman, of Chicago.

X. A Lantern View of the Pulp Chambers and Canals, showing Typical Forms and Variations, by Dr. D. M. Cattell, of Chicago. Discussion to be opened by Dr. G, V. Black, of Jacksonville.

XI. Efficiency and Simplicity in Regulating Appliances, by Dr. E. H. Angle, of Minneapolis, Minn., illustrated by stereoptican. Discussion to be opened by Dr. C. S. Case, Jackson, Mich.

XII. Low Fusing Continuous Gum Body, by Dr. George Cunningham, of Cambridge, England. Discussion to be opened by Dr. A. B. Ames, Chicago.

XIII. Report of Supervisor of Clinics, by Dr. Louis Ottofy, of Chicago, chairman; with discussion.

CLINICS.

Dr. W. O. Kulp, Davenport, Iowa, Art Technique; Dr. J. P. Wilson, Burlington, Iowa, Root Filling; Dr. R. H. Mace, Belleville, Ill., Gold Crown; Dr. W. H. Taggert, Freeport, Ill., Filling at the Cervical Border, using extension arm cervix clamp; also a new Suspension Removable Bridge.

Dr. W. B. Ames will demonstrate Dr. Cunningham's Low Fusing Body for Continuous Gum.

Dr. Edgar Palmer, La Crosse, Wis., Administration of Narcotic Vapors, using valved inhalers.

Dr. A. O. Hunt, Iowa City, Iowa; a New Bridge; Dr. E. E. Hughes, Des Moines, Iowa, Gold Inlay; Dr. George H. Slyfield, Waukyhn, Ill., Contour Gold Filling.

Dr. K. B. Davis, Springfield, Ill., Artificial Crown; Dr. S. F. Duncan, Joliet, Ill., Method of Striking up Crown Tips.

It is particularly requested that those having pathological specimens, peculiar cases, models, new appliances and methods will bring them to the meeting.

All practitioners of Illinois (including non-members) and of other States are cordially invited to attend. They are especially urged to be present at the opening day and to remain through to the last session.

The usual reduction in hotel rates and railroad fares will be allowed.

J. W. WASSALL,
Chairman Executive Committee.

Bibliographical.

The first edition of Professor Chapin A. Harris' "Dictionary of Medicine and Dental Surgery" was published in 1849, and a steady and increasing demand for the work encouraged the author to prepare a second edition in 1854, the first having long before been exhausted. The object of the author, at a time when dictionaries of medicine were few in number, and not easily accessible to the dental practitioner and student, was to present a work containing satisfactory definitions and technicalities belonging to Dental Surgery, as well as to the other branches of medicine and to the collateral sciences, in the belief that such a work was greatly needed; and subsequent reflection convinced him that a more extended view of the subject was necessary owing to the fact that the scope of professional education for the dentist had become so widened that general medicine and collateral science had at that time become, to a considerable extent, embraced in the curriculum of dental study. The second edition, therefore, contained, as a result of such reflection, about eight thou-

sand more words than the first edition, and, to prevent an undue increase in the size of the work, the heavier and more elaborate articles were rewritten and abbreviated, and the bibliographical and biographical departments were altogether omitted. All the words, technicalities, and other subjects belonging to Dental Surgery proper, were, however, retained, and all new terms descriptions of subsequent discoveries and improvements in the art and science were carerully added. Numerous synonyms were also introduced, and no important word, in any of the specialities of medicine, was refused a place and a minute and careful definition. The author made, as he stated, free use of the dictionaries, lexicons, and other works on medicine, surgery, pharmacy, physics, chemistry, natural history, etc., which at that time were available. He was also materially assisted by the late Professors A. Snowden Piggot and Washington R. Handy in the preparation of the second edition. The third edition of this Dictionary was not published until 1867, almost seven years after the death of its author, Professor Chapin A. Harris, which occurred in 1860. It was edited by Professor Ferdinand J. S. Gorgas, as have also the succeeding editions, including the present one, who found it necessary to add to this third edition nearly three thousand new words with their definitions, etc. In this edition the doses of the more prominent medicinal agents were added to their definitions, and many obsolete formulæ were omitted, while others were retained for their intrinsic merits, and a number of valuable ones were added. As the work entitled Harris' "Principles and Practice of Dentistry" contained full descriptions of the treatment of diseases of the dental organs, such were briefly referred to, and reference made to the work in which they were to be found. Due acknowledgment was made to the authorities from which interesting matter was obtained in the preparation of the third edition.

Ten years elapsed before another edition of this Dictionary (the fourth) was published, and the object of the

editor in preparing the fourth edition was to bring the work thoroughly up to the requirements of the profession of dentistry at that time. Both the dental and medical portions were carefully revised, and many additions made. All new agents of the Materia Medica employed at that time in dental practice were added, so that nearly every one of its seven hundred and forty-three pages contained corrections and additions. The fourth edition was published in 1877, so that a still longer period has elapsed between its appearance and that of the present one.

The object of the editor in preparing this, the fifth, edition of "Harris' Dictionary of Dentistry," has been to make it a more purely dental work than ever before.

Such an object he has endeavored to accomplish by the addition of many hundred words and definitions, which are useful to the dental practitioner and students in qualifying themselves for the study and practice of the science and art of dentistry, and also by the omission of many words and phrases which do not in any manner pertain to dentistry.

The many Medical and other Dictionaries now in use, supply all words and definitions of medicine, chemistry, botany, etc., which are not necessary in a Dictionary of Dentistry. All new words and phrases which have been acknowledged and approved as correct and useful in such a work on dentistry have been carefully selected and used in the present edition, and the obsolete ones, which occupied a large portion of the former editions, have been omitted. The best authorities, such as Gould, Buxton, Quain, Turnbull, Heath, Black, Bloxam, Watts, Fowne, Tomes, and many others, have been consulted, and the object has also been to include in such a selection brief but comprehensive descriptions of the many new operations and appliances which have been generally adopted by the dental profession since the publication of the preceding edition of the work. It is the cherished hope of the editor that the labor and time he has bestowed upon the present

edition may be as favorably appreciated as have been his former efforts; and, also, that the new features presented may give this edition of the Dictionary a great superiority over former editions.

Monthly Summary.

HÆMORRHAGE AFTER TOOTH EXTRACTION AND THE IMMEDIATE TREATMENT.—In order to intelligently treat a case, it is essential to ascertain if the blood that is being lost is or is not coagulable. To ascertain this, a little of the blood is caught in a cup; a firm clot will form in two or three minutes, if it is coagulable. For coagulable blood his treatment is with a styptic, or with a plug, with or without styptic. This cautery is his last resort and is only called for in case of non-coagulable blood. He considers nitric acid as the best styptic, but does not use it except other more convenient ones fail. He invented styptic colloid, which is composed of tannin in collodion, with addition of tincture of benzoin; and for ordinary cases he knows of none better. The colloid can be applied on cotton-wool and a firm plug of it inserted with much facility. He makes three kinds of plugs. *One* made of soft, well-teased wool saturated with the styptic colloid. A second plan is to use perchloride of iron, saturating cotton-wool with the solution and then drying the cotton down. He has also constructed what may be called the *wick styptic*, very useful in minor cases. It consists of a glass tube having a narrow point, through which is drawn a piece of cotton wick saturated with perchloride. A portion of the wick projecting from the narrow end of the tube can easily be inserted and firmly held in the cavity; when it becomes saturated with blood it can be cut off, a new bit pulled out and a fresh application made. He considers

the best plug: one consisting of gutta-percha saturated with styptic, tannin or perchloride of iron. One of these disc, picked up by the forceps and held for a short time in hot water, softens, and becomes so malleable that it can be inserted into any cavity. The bleeding socket is quickly dried with absorbent cotton, and is then filled with the plastic styptic, pressed firmly down to the bottom and held there until it becomes firm. There is no fear of putting in the plastic styptic too hot, since heat favors coagulation. Presuming that the blood flowing from the injured part shows no tendency to clot, and is discharged in a steady stream which is *not* arrested by pressure or the ordinary applications, it is necessary at once to produce secondary or albuminoid coagulation. It must be remembered that no blood is constituted that cannot be made to coagulate. The electric cautery, if at hand, is the most convenient. The next best is a small iron cautery, an iron bulb terminating in a rounded point and fixed at an oblique angle in a strong handle. This bulb and point can be made red-hot in the flame of a spirit lamp or gas jet. It may be allowed to cool down until redness has disappeared, and can be inserted deep down into the bleeding alveolus; it should never be used at such a heat as to destroy structure. The coagulating power of heat over albumen, viz., 140 F., is all that is required, but this may be safely exceeded to 150 or 160 degrees. If all these means fail, God help the patient. He cautions against the use of stimulants, faintness being an advantage. The blood swallowed causes no harm—it is either digested or vomited. After treatment, mainly constitutional, he leaves to the physician. One form of plug used he does not mention, the plaster of paris. Last winter we had a case in which it had the desired effect. An inferior molar had been extracted, severe hæmorrhage followed; plaster of paris was mixed, quite thick, placed in the socket and allowed to extend over the proximal teeth; when hard it was trimmed smooth. The next day the patient removed the plug,

hæmorrhage set in, the plug was cleaned, replaced, with a cessation of the flow. After two or three days the plug was left out, the case being cured.—*Dr. B. W. Richardson, in British Dental Journal.*

DENTAL PROSTHESIS.—"Prosthesis" is defined by Webster as follows: "In surgery, the addition of an artificial part to supply a defect of the body, as a wooden leg, etc." If we make a similar use of the word in dentistry, then dental prosthesis must mean the restoring of a dental defect by an artificial part, which would include, of necessity, fillings, crowns, bridges, plates, obturators, etc. This would divide the practice of dentistry into three branches —dental medicine, dental surgery, and dental prosthesis— the first to include all treatment depending on medicine; the second, surgery; the third, as indicated in the foregoing.

Dental prosthesis has had its fall, and now is on the up-grade, having greatly advanced since the advent of crowns and bridges. The introduction of rubber was the cause of its fall. Since the adoption of crowns and bridges, students take more interest in this branch, as there is a demand for such operations in all the land. The making of crowns calls for a knowledge of the working of gold, and it is but a step from making crowns to gold plates; hence, the recent graduates will take more kindly to the old regime, regarding plate-work in vogue previous to the advent of rubber. There was a time, shortly after the coming of rubber, when the maker of artificial substitutes for the human teeth was looked upon as being but a mechanic, and the idea of separating the two branches was seriously advocated, but that is all changed since the era of crowns, the connecting link between mechanical and operative dentistry, as then existing. Just why mechanical dentistry, a misnomer, should ever have been looked down

on by the operative dentistry, is hard to comprehend by one who is an all-round dentist.

Those who have practiced general dentistry know that it requires more ability to insert a satisfactory artificial set of teeth than to fill a tooth with gold.

Dental prosthesis requires that the operator must be a good mechanic, an artist, physiologist, anatomist and physiognomist: a mechanic and artist, in order that he may be able to select the proper teeth and arrange them to harmonize with the natural parts; a physiologist, in order to understand the action of the oral muscles; an anatomist, to know them; a physiognomist, to understand the expression of the human face. The number practicing dentistry who fulfill all these requirements are few. This is proven by the failures, evidenced by actual observation in our daily contact with those who are disfigured by artificial teeth, often correctly called "false teeth."

TEETH IN DIABETES.—The importance of early diagnosis in diabetes cannot be over-estimated, because the prognosis may be much influenced by the institution of early treatment. It is interesting, therefore, to call attention to the fact that the *Wiener medizinische Presse*, January 4 1891, contains a brief abstract of a publication by Magitot in *Bulletin medical*, in which he dwells upon the diagnostic significance of alveolar osteo-periostitis as a manifestation of diabetes. He has noticed, in this disease, a deviation of the tooth, which, later, becomes loosened. At the same time an alveolar catarrh exists. Ultimately the tooth falls out. In the further course of the disease, the alveolar border of the bone may be absorbed, and this in turn may be followed by gangrene of the gum.—*Medical and Surg. Reporter.*

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ARTICLE I.

THE ODONTOLOGICAL SOCIETY OF GREAT BRITAIN.

The Ordinary Monthly Meeting of the above Society was held on the 2nd March. The President, Mr. S. J. Hutchinson, M. R. C. S., L. D. S. Eng., in the chair, and a full attendance of members. The minutes of the previous meeting were read and confirmed.

Dr. A. W. W. Baker's (of Dublin) admission to membership was announced, and Mr. T. Maudsley Howkins, of Hull, was elected a member of the Society.

Mr. H. B. Gill, Upper Norwood, was proposed for membership.

Mr. Storer Bennett (on behalf of the Librarian) stated that two papers had been sent for the library of the Society, viz., the Calendar of the Pharmaceutical Society, and the October Number of the Transactions of the Odontological Society of Germany. He mentioned also (in his capacity as Curator) that two models had been presented to the Society by Mr. Bulkley Hughes, of Dumfries. One, an

upper model showing two supernumerary teeth erupting in the palate. In this case it was stated by Mr. Hughes that a considerable amount of hæmorrhage attended the extraction of the teeth. The other model was taken for a boy aged fourteen, and showed a conical supernumerary tooth, which was also extracted. Mr. Storer Bennett, continuing, related the particulars of a case of alveolar abscess of three years standing, and remarked that it was exceedingly interesting and instructive. It was that of a root of an upper lateral incisor which was under treatment for four years, more or less. The case forcibly illustrated the disastrous consequences which may supervene from cleaning out a root canal with a drill which is not properly directed, owing to the risk of piercing the wall on one side or the other. In 1886 the patient, a young lady, then about fifteen years of age, had a cavity on the palatine surface of a right upper lateral incisor filled. About a year after a sinus formed and pointed opposite the apex of the tooth. The dentist whom she consulted then removed the filling, enlarged the root canal with a drill, and filled the canal with gutta percha. This made matters worse, for a second fistula formed and discharged through the gum below the first one. The patient therefore went to another dentist, who removed the gutta-percha, but without giving relief. She thereupon went to a third dentist, who very confidently expressed himself capable of treating the case. He, however, treated it on alternate days for six weeks without any signs of the discharge getting less. He then suggested that a London dentist should be consulted, which was done. The London dentist stated it as his opinion that the discharge was not in any way due to the abscess at the end of the root, but suggested that possibly there had been a perforation; a suggestion which an examination of the specimen would show to be correct. A short time after this the patient had occasion to see a surgeon about her throat, and he said its condition was not due to the teeth. The patient was now recommended

to have the tooth removed, but after the unsuccessful attempts to give relief, extending over three or four years, she was not at all willing to consent to have the tooth extracted, but she ultimately did so, when it was discovered that the drill had been directed too far forward, and had pierced the anterior wall, while the plug of gutta percha with which the root had been filled had been driven through the foramen, and it was due to this that all the subsequent mischief had occurred. The specimen (handed round) spoke for itself, but Mr. Storer Bennett thought that in addition to the importance of not using a drill which would cut a channel for itself, but rather an augur drill, the case should impress upon them the necessity of not too readily assuming that a case is easy of treatment, especially when it has already been under the care of somebody else, who in all probability has given it thoughtful attention.

The President said that with regard to the casual communication of Mr. Storer Bennett, it would facilitate discussion if the specimen were handed round, and any remarks deferred until after the specimen had been seen. In the meanwhile he would call upon Mr. Ackery for a casual communication.

Mr. J. Ackery said that in bringing forward the two or three cases to which he was about to call attention, he was afraid he was doing so without being able to give any very distinct history. The previous history had not been well known, but the fact in itself gave the greatest scope for discussion as to the cause of the abnormalities.

In the first instance the model he wished to show was that of a lad aged fifteen or sixteen, in which the right lower first molar had become impacted, remaining on a lower level than the second molar. His object in bringing the case before the Society, was to get hints as to its probable cause. The puzzle was how a six year old molar could become impacted in this way. In his experience it was unique. The tooth was carious at its posterior aspect,

and as the patient had not got his wisdom teeth, Mr. Ackery though it best to remove the misplaced tooth. This he did, and the wisdom tooth afterwards erupted very nearly in the position of the second molar. Another case quite inexplicable to his mind, was that which occurred in a member of his own family. The second upper molar had never come down to its true level. The first molar was tilted forward. There had never been any irregularity in the lower teeth to account for the position of the upper, and it had occurred to him whether there was gemination at the roots.

The third case was that of a medical man, in whose mouth the right upper second bicuspid was only partially erupted, high above the alveolar border in the sulcus. The tooth showing signs of caries, and being quite useless, Mr. Ackery thought it better to extract, before the presenting portion became broken down. On removal the root was found to be of less than half the normal length, and quite flat and even. (The tooth was shown.) Mr. Ackery said the appearance of the end of root was not like an ordinary absorbed surface, it was certainly not fractured, but might possibly be due to some interference with complete calcification. The specimen he hoped to have microscoped, and shown at some subsequent meeting.

The fourth case was simply an upper model, showing both temporary and permanent canine, simultaneously present on either side of the mouth, and in the true arch, but on the right side the bicuspids were rotated, so that their long axes were antroposteror, and they were lying side by side, one being lingual and the other labial.

Mr. David Hepburn, being called upon by the President, said that he did not propose to occupy the time of the Society for more than a few moments, but very often in ordinary practice some contrivance suggested itself which proved to be a convenience, and which, when used, after a time became indispensable. The dressing stand (shown) was devised so as to form a convenient receptacle for small,

quantities of drugs for daily use; it was circular and pyramidal in form, and revolved. It consisted of three tiers, reduced to the smallest possible dimensions consistent with utility. The lowest tier was provided with a number of small boxes for amadou, gutta percha pellets, bibulous paper pellets, and so forth. The second tier contained receptacles for bottles without necks, and with covers on hinges. The third tier was for the spirit lamp. Mr. Hepburn suggested that for the purpose of readily recognizing the whereabouts of the particular drug desired to be used, the bottles might be of different colors; thus pink might be associated with carbolic acid, and green with arsenic. This plan might also be extended to the bibulous paper pellets. He had found the arrangement of considerable use himself, and therefore ventured to bring it before the Society.

The President mentioned that Dr. Scanes Spicer had been good enough to bring two patients for them to see, and as it would be necessary to see them in a darkened room, perhaps it would be convenient to do so at the close of the meeting. Mr. Ashley Barrett had also brought a patient, showing a case of double dislocation of the jaw, and he would call upon Mr. Barrett for his communication in connection with it.

Mr. Ashley Barrett said that the patient presented herself at the out-department of the London Hospital about three months ago, and complained of almost complete inability to open her jaws. There was considerable pain on the left side of the mouth in the neighborhood of the wisdom teeth. Mr. Barrett opened the mouth, under chloroform, with a screw opener, finding it necessary to use only a moderate amount of force. He extracted the molar—a certain amount of inflammation was going on round it, and in the neighborhood of the masseter muscle. In January the patient come again to the hospital, and said that every time she opened her mouth the jaw clicked, and on examination, apparently the condyle of the inferior maxilla slid

over the articulatory prominence, and when she closed her mouth again the dislocation on both sides was reduced. She said it all but entirely prevented her eating. There was a good deal of pain, and the clicking noise produced constant headaches. The points upon which Mr. Barrett would be glad to have the opinions of members were, first, the cause of the dislocation, and secondly, the best mode of giving relief. With regard to the cause, it seemed to him to be a somewhat obscure matter. On consideration Mr. Barrett thought three possible conditions might have caused it. The patient was a young woman of loose fibre, aged 24, and complained of clicking in every joint. The right shoulder joint dislocated, and the left knee. It occurred to him that possibly she might be affected with rheumatoid arthritis, which sometimes affects the jaw; there might be, accompanied with this, a growth of bone about the glenoid cavity, which might be the cause of the pushing forward of the lower jaw. Mr. Barrett was not quite clear in his own mind whether complete dislocation existed. The second suggestion was that possibly, though he was not conscious of it, he might, in opening the mouth with the mouth opener, have done some violence to the capsular ligaments. The third possible cause which occurred to him was that possibly the capsular ligaments might have wasted and become very lax, the external pterygoids might also act in an inco-ordinate manner, and they might draw the condyles forward. Mr. Barrett could not account for the condition, except on one of those three hypotheses. As to relief, it occurred to him that this slipping of the jaw might be prevented by mechanical means, and for this purpose he had constructed a head-cap with bands which connected it with a chincap, made of vulcanite, so that a constant traction might be exercised on the jaw, and he was hopeful that by contiued action, the condition might be improved. Further, he might mention that the patient had no front teeth, a circumstance which he proposed to utilize by making a strong metal plate, with

rather long upper incisors, which he hoped would prevent the jaw slipping forward.

The President remarked that they seemed now to have a considerable amount of matter to discuss. Perhaps it would be better if any members had remarks to make on Mr. Storer Bennett's case, that they should be made now.

Mr. W. H. Coffin wished to say that about a year ago a lady came to him under almost similar conditions to those described by Mr. Bennett, the only difference being that the lateral incisor root carried a pivot and an Ash's tube tooth on a gold pin. Every effort to alleviate the discharge failed, and Mr. Coffin extracted the root with the pivot, and found as he had expected that there had been a perforation, in almost the same position as in Mr. Bennett's case. The gold pivot protruded about 1-32 inch. After removing the pivot and making the root smooth on the outside, he replanted it and it became perfectly firm. Mr. Coffin afterwards mounted a Logan crown on the root and the case was doing perfectly well. He mentioned this case because it would encourage them to extract and replant a similar tooth.

Mr. F. J. Bennett commenting upon Mr. Barrett's case, said that it scarcely would appear to be a true case of dislocation of the lower jaw. It seemed to him to be more a gliding forward movement on the condyle and was probably due to the relaxation of the ligaments and increased by constant repetition. Probably if such a splint as Mr. Barrett had suggested were rigorously applied for a few months, it would restore the jaw to a proper movement. In such cases he believed the explanation was that the condyle was unusually flat, and the glenoid cavity unusually shallow. In such circumstances it was not rare to find a little forward movement of the jaw, but not a true dislocation. With regard to Mr. Ackery's case, from his description it reminded Mr. Bennett of a case he had seen in private practice. The first lower molar was impacted

between the second lower molar and bicuspid in front; this was exposed and of such a curious shape that Mr. Bennett thought it was a denticle, but he found on extracting it that it was an illformed tooth with a conical fang. Mr. Bennett believed that it had been pointed out by Tomes and others that the position was largely due to the growth of the fang, and therefore he concluded in his own case that in consequence of the fang being much dwarfed and conical, it had been overtaken by the second molar and bicuspid, and once being behind in the race had been held out of position by the other teeth.

Mr. F. Newland-Pedley expressed his agreement with Mr. F. J. Bennett as to the nature of Mr. Barrett's case. He did not for a moment think it was a case of perfect dislocation. He had the pleasure to exhibit a model of [redacted] mouth of a man, aged twenty-four, who inherited syphilis. When about six years of age he got necrosis in the palate, and about four years afterward he erupted a tooth.

Mr. W. H. Coffin then exhibited a paper disc with a peculiar central perforation, the invention of Dr. J. A. Kimball, of New York, consisting of a combined slit and hole allowing the flat head of a screw mandril to be passed through bodily, without the necessity of completely removing the screw from the mandril.

Dr. Job Collins then read a paper on

"ASSOCIATED AND RELATED OCULAR AND DENTAL DISEASES."

Bain had observed "Nowhere more than in medicine may laws of causation be defeated; there is rarely such a thing as a simple cause yielding a simple effect." Power had indeed stated his belief in a causal connection between phlyctenular ophthalmia and carious teeth, but on another page he recognized the ambiguity of such a conclusion, owing to the extreme frequency with which dental affections present themselves. Statistics then, said Dr. Collins, seem of little avail, and a deductive method of proof and judicious empiricism seemed the only resort. On the other

hand, Hutchinson from an examination of 102 cases of interstitial keratitis was able to arrive at the induction that the disease was due to inherited syphilis, and was very frequently accompanied with a characteristic physiognomy and definite irregularity. The same author's demonstration of the remarkable concomitance of laminar cataract, defective enamel, especially of the first molars, and Arlt's connection of the former with infantile convulsions, were not less suggestive of some underlying relation between ocular, dental and general aberration. Bearing in mind the destination of the whole of the 2nd, 3rd, 4th, 6th and parts of the 5th and 7th cranial nerves, together with the sympathetic to the eye and orbital contents, eyelids and muscular appurtenances, and the associated rich innervation of the teeth by the other two large sensory divisions of the great trigeminal nerve, it was impossible to fail to appreciate the opportunity of inter-communication afforded. Accepting the truths which physiology teaches of relaxation, transference, radiation and so-called "sympathy," there seemed an *a priori* probability that in certain circumstances conditions must arise in which afferent impulses ascending the dental nerves should manifest divers sensory and motor phenomena, in the complex system composing the organ of vision. There were affinities developmental, histological and general between the eyes and teeth which must not be lost sight of when taking a broad view of the two factors whose interaction was to be investigated developmentally; an analogy by no means fanciful might be found in the fact that with the eyes, as with the teeth, an epiblastic invagination co-operated with a vascular mesoblastic intrusion in the genesis of the organ. A liability to sympathetic tendencies and lesions might thus be laid at the outset. The connecting link of non-vascularity of the dentine and enamel and cornea and lens was worthy of remark. The correspondence of the two sets of phenomena might be less true in point of time than in essence, and in their later life histories there was little of analogy between

the cyclic changes of the two dentitions, and the age changes which eventuate with the eyes. Prefacing a citation of cases with the remark that the indirect class, especially such as were recorded before the days of the ophthalmoscope, and before Donders demonstrated the pathology of concomitant squint—*i. e.*, before the sixties—were of little value. Dr. Collins referred to the case quoted by Sir Wm. Lawrence from Galenzanski, spoken of by Mr. Power as the most brilliant and complete on record of reflex amaurosis from irritation of dental branches of the fifth. It was the case of a man aged thirty, in whom a splinter of wood perforated the fang of the first left upper molar which was carious; swelling and pain of the cheek on that side occurred, and later on mydriasis and blindness, which was said to have been complete; this lasted a twelve month, and when the cause was detected by Galenzanski and the tooth with the splinter removed, restoration of sight quickly ensued. The effect of an orbital cellulitis directly upon the optic nerve and the striking and rapid improvement of sight after evacuation of inflammatory effusion, was well shown in a case recorded by Mr. Critchett. Dr. Collins stated that cases of definite ocular disease for which a dental cause could be satisfactorily established were very decidedly rare. He had searched the ten extant volumes of the Ophthalmological Society in vain for a clear case of the kind classed in his second group. He found a case of fatal orbital cellulitis resulting from periodontitis and necrosis of jaw, and one of associated neuralgia or anæsthesia of the fifth, with ocular troubles; but no reflex amaurosis or phlyctenular ophthalmia, or glaucoma or ophthalmoplegia, or failure of accommodation attributed with any assurance of proof to dental lesion. Mr. Power's comprehensive paper, which laid under contribution most of the available literature on the subject up to that date, yet only contained two detailed cases which had come within Mr. Power's own experience. One was a young woman with neuro-paralytic ulcer of the cornea; she had

corneal anæsthesia and ulceration with hypopyon, and though there was some improvements after taking out some teeth, yet the eye subsequently had to be abscised. The other case was one of double glaucoma in which a cystoid cicatrix followed each iridectomy, and both eyes were lost. She had had toothache, and an abscess was always found to exist at the root. Mr. Power did not seem either to suspect or assert dental cause in this case, nor did more extended knowledge of the pathology of glaucoma since acquired, suggest it as likely. Indeed Mr. Priestley Smith by measuring the tension of the eye in cases of toothache at the Dental Hospital, found no reason for thinking that toothache affected ocular tension, and though his number of observations were but few, yet there seemed good ground for his conclusion, "That the part played by ordinary forms of facial neuralgia in glaucoma is not of primary importance."

In the discussion which followed Mr. Power's paper, Dr. Collins was only able to find records of eight cases of oculo-dental lesion contributed by the sixteen speakers. Mr. Smith Turner related a case of amaurosis from antral abscess. Mr. Charters White mentioned a case of keratitis with a carious bicuspid. Mr. Coleman brought forward a case of amaurosis from pivoting a left upper central, and added that conjunctivitis was the commonest ophthalmic trouble resulting from dental irritation. The amaurosis case seemed to be the same as elsewhere referred to, and it was stated by Mr. F. J. Bennett on the authority of Mr. Lawson, that the ocular trouble was iritis, and in no way due to reflex dental irritation. Mr. Spence Bate related a case of neuralgia in the eye relieved by the removal of carious upper molars, and three or four other speakers quoted cases in which ocular and dental troubles were supposed to be more or less related to each other. Dental surgeons were evidently on the alert for cases of the kind to which Dr. Collins was referring, yet the records of the transactions of the Odontological Society

were few and far between. Mr. Henry Sewill had related and reproduced in his "Dental Surgery" a most interesting case of spasm of the obicularis, neuralgia and cataract, apparently due to tender, carious and much neglected teeth on the same side. Appropriate treatment of the teeth cured the spasm and neuralgia, but of course not the cataract. Having quoted other cases, both from his own case-book and other sources, Dr. Collins proceeded to say that he had never seen a case of glaucoma, acute or chronic, which appeared to be in any way caused by diseases of the teeth; the neuralgia of the head and cheek was common enough in such cases. He remembered a case of intense supra-orbital neuralgia, which was puzzling; later, however, the neuralgia gave way to total anæsthesia over the area of distribution of the supra-orbital nerve. On deep pressure, a lump was felt, evidently involving the supra orbital nerve trunk, this was removed, was as large as an almond, and was composed of granulation tissue; there was a history of syphilis, and it was possibly a node. Dr. Collins had paid a good deal of attention to failure of the accommodation, and, notwithstanding the statements of H. Schmidt, he much doubted whether dental neuralgia had any other effect in this direction than that of general depression, and consequently, as with so many other deflecting causes, as blood losses, the puerperal state, hyper-lactation, convalescence from exhausting fevers, in a measure restrict the range of accommodation. In sixteen persons suffering from toothache tested by Dr. Priestly Smith, fifteen had no anomaly of accommodation. Nor did Dr. Collins think paralytic affections of the external or internal muscles of the eye or lids were often, if ever, traceable to dental disease. A reflex paralysis presented some physiological difficulties, and a reference to "inhibition," which seemed to imply some normally exerted motor influence, did not elucidate the matter to his mind. He felt obliged to confess to scepticism as to the satisfactory demonstration of cases of reflex amaurosis arising from irritation of the dental nerves, apart from direct extension of inflammation through the maxilla. Such cases became more frequent in literature

as the student receded into pre-ophthalmoscopic and less critical times, and became rarer and seemed to disappear when they were most vigilantly enquired for. The deep origins of the optic nerve, though not precisely determined, would appear to be far removed from the fifth, and the path of such reflex amaurosis proportionately circuitous and improbable. Of associated ocular and dental lesions, such as keratitis and notched teeth, and lanular cataract and "rachite" teeth, every ophthalmic surgeon had abundant instances at hand. But it was curious to notice how often many who should know better appeared to confound the normal triple denticles which the permanent incisors exhibit normally when first cut, and which often remain some years before they are ground down with Hutchinsonian notched teeth of hereditary syphilis. It is, Dr. Collins submitted, by the defective enamel of the central denticle causing this to be broken away that the notched appearance results, and he exhibited a photograph which served to illustrate this process.

The President said. with reference to the paper which Dr. Collins had just read, he was quite sure he was only expressing the unanimous feeling in thanking him for his extremely valuable contribution. If this iconoclastic paper had smashed their idols, they must accept their fate and not so hastily jump at conclusions which some appeared to have done, he (the President), amongst the number.

Mr. F. J. Bennett said, with reference to Dr. Collins's allusion to the case which occurred while he (Mr. Bennett) was a student at the hospital, and which caused some interest at the time as to the doubt expressed whether or not it was a true case of reflex amaurosis, the case wss one in which the patient having a lateral tooth pivoted, suffered from iritis. It was due to the pivoted tooth that she was first taken to the hospital, and seen by Mr. Lawson himself. Mr. Lawson expressed himself in most decided terms as to the iritis being in no way of dental origin. Mr. Coleman was of a different opinion, and had expressed his opinion on more than one occasion. Mr. Bennett had always felt it his duty to put this fact on record, whenever this case was put forward as an example of a connection between amaurosis and dental

trouble. It should be remembered that this case was seen by no other ophthalmic surgeon, a fact which he thought should be noted; he believed Mr. Tomes had expressed himself in a guarded way, and he classed it among doubtful cases.

Mr. Albert mentioned, as illustrating the difficulty of tracing the relation between cause and effect, the case of a little child of his acquaintance, aged about seven or ten, suffering from ulceration of the cornea. She was taken to one of the first oculists in London, and he treated her in the orthodox way. After three or four months, as the ulceration did not clear up, she consulted Mr. Power, who attributed the lesion to a temporary molar; this was extracted and the ulceration disappeared.

Mr. C S. Tomes wished to say one word about a case Dr. Collins had alluded to, seen by Mr. Critchett. A case of repeated attacks of cellulitis, coincident with which there existed a peculiar condition of the mouth. It was a remarkable case; the patient was very bad indeed, and seemed almost to be dying. There was never any suppuration, only serum. The teeth were very stunted from a girl, and there were very few permanent teeth. Those that she had were very stunted, pointed, peg-like sort of teeth with hardly any enamel, and they were erupted to a very small extent only. But on no occasion upon which he saw the patient, was there any inflammation about the necks of the teeth, though he did not see her quite in the first instance. Some of the teeth which were removed were sound. The recurrence of the cellulitis, and dental pecularities, did not suggest cause and effect, but rather concomitant conditions. He could not, in his own mind, connect the condition as cause and effect, nor could he think of any case like it. But there they were, the very stunted teeth cut long after the normal period, and at long intervals. It did occur that cellulitis was coincident with the cutting of the teeth. But there was no abscess or inflammatory condition.

Mr. W. A. Hunt, Yeovil, remembered being present when Mr. Power read his most interesting paper. It was a paper which produced a suspicion that there was a connection between conditions of the eye and of the teeth. He thought

Dr. Collins' sceptical paper would induce the dental profession to examine very carefully the evidence brought forward in support of any supposed connection between diseases of the eye and teeth. Dr. Collins's paper had been read in post-ophthalmoscopic, not pre-ophthalmoscopic times, and Mr. Hunt thought that there existed now more than ever a very strong suspicion of the connection between certain dental and ophthalmic conditions. They might not have all the evidence that Dr. Collins required, but as he had said eight years ago, he hoped that careful notes would be taken of any cases affording grounds for supposing a relation of the one and the other, so that the details might give something definite, and no mere hypothesis to work upon. He believed, and he was speaking from his own experience, that there *was* a connection between certain diseases of the eye and teeth. When surgeons were found removing one eye lest the other might be affected; when constitutional and local disturbances were shown to be related to each other, he could not help thinking that there might be a connection between functional disturbance of the eye and diseases of the teeth.

Mr. F. J. Colyer wished to mention a case of slight corneal ulcer treated by Mr. Power of Westminster Ophthalmic Hospital, without success. In the temporary molar there was a fig pip which was pressing on the exposed nerve. On removal of the tooth the corneal lesion got well.

Mr. Morton Smale thought that dentists were a little inclined sometimes to jump at hasty conclusions, and that they should therefore be very much indebted to Dr. Collins for breaking up some of their idols. After Mr. Power's paper, Mr. Smale began to think he had been very neglectful in failing to observe related conditions between the eye and teeth. Shortly after, a colleague at Westminster Hospital sent him a case of glaucoma in which there were some decayed stumps on the side of the glaucoma, of which he thought they might probably be the cause. After Mr. Power's paper, Mr. Smale thought so too, and he accordingly removed the stumps. Things went on very nicely indeed for about a year, when he saw his patient again, and congratulated him on the cure of the glaucoma; he had hardly done so when the glaucoma re-

curred. This case had hardly left him, when an almost similar one was sent him by a fellow student, who thought the glaucoma might be due to the decayed teeth, but in spite of the removal of these teeth by Mr. Smale, and putting the mouth in good order, the glaucoma continued, and the patient had finally to be operated upon.

Mr. Paterson after expressing the pleasure with which he had listened to the paper, notwithstanding it had bowled over their idols, alluded to the obvious nervous connection between the eye and teeth, in view of which, he said, irritation of either might be expected to affect the other. He mentioned the case of a superior canine the pulp of which was dead, and the tooth so much decayed as to have little more than the stump left, which had been subjected to abscesses; this was attended with severe lachrymation on the same side, but the lachrymation disappeared on the removal of the stump. Another case was that of a supernumerary bicuspid-like tooth, carious and abscessed, also attended with lachrymation, which vanished on extraction of the tooth. Mr. Paterson, in conclusion, urged the importance of ophthalmists co-operating with dentists in recording and comparing the treatment and result of cases.

Dr. Collins briefly replied.

Dr. Scanes Spicer's two patients were then examined in a darkened room. One a male and the other a female, were each suffering from empyema of the antrum on one side of the face only, the other side being healthy. A small incandescent electric bulb having a reflector which projected the light upwards was placed in the mouth, which was then closed. The external transluence of the healthy side of the antral region was very decided, more particularly in the neighborhood of the canthus, but on the side where the infiltration existed there was no illumination.

The usual votes of thanks concluded the meeting.—*Dental Record.*

ARTICLE II.

THE OBTUNDING OF SENSITIVE DENTINE.

BY GEORGE F. EAMES, M. D., D. D. S.

The dentist who has just used an excavator in removing a little superficially decayed dentine finds an immediate response from the patient, who informs the operator that he has "struck the nerve." The dentist kindly explains that it is only "sensitive dentine," at a considerable distance from the nerve itself. If asked, "what *is* sensitive dentine?" the practitioner will say, if well read in all the modern literature pertaining to this subject, "I do not know; I can only designate it by certain phenomena consequent upon irritation of this structure. We all know that it is often sensitive or painful when touched, and we name the condition from this symptom alone, because we have no real knowledge as to the *modus operandi* or mechanism by which pain is induced, or of the peculiar condition of the parts involved which permit these phenomena."

In recent years pain obtundents and local anæsthetics have been introduced in great profusion, while there is a scarcity of literature which considers the physiological and pathological basis upon which anæsthetic agents may be used. This indicates that the general practice is largely empirical, and this impedes the progress of the profession.

It is time now to ask why the obtundent obtunds and how it does it. Allow me, if you please, to refer to the anatomy and physiology of tooth structure only in sufficient measure to be of assistance in more clearly elucidating the subject. We are to speak principally of the dentine which forms the main bulk of the tooth, and within which is a canal or canals with the largest diameter at the pulp. At the periphery of the pulp and the dentine is a layer of odontoblastic cells which send prolongations into the dentinal tubuli.

This description is, in substance, I believe, generally accepted, although, like other anatomical structures that are microscopic, it may be questioned. Magitot, for instance, denies the existence of these odontoblastic cells, holding that the dentinal fibril is a continuation of a layer of reticulate cells which lie beneath the odontoblasts, while Klein maintains that the only office of the odontoblast is in the formation of the dentine matrix, the dentinal fibril being a prolongation of cells originating between the odontoblasts.

All must agree, however, in the existence of a protoplasmic material throughout the entire structure of the dentine, giving it both nourishment and sensation. We say sensation; *why* do we say it? Is the dentinal fibril capable of transmitting sensation? Let us see. The functions of the dentinal fibril, the various influences that may affect it, its relation to the tooth-pulp, may well form the principal subject-matter for our study in sensitive dentine, for it seems only reasonable that, whatever may be the method of conducting painful sensations from the dentine to the brain, this living matter in the dentine must be the *medium* through which it reaches the pulp. The sensation of pain having reached the pulp, we readily see how it may be conveyed to the brain by reason of the well-known function of the sensory nerves; but the dentine has no nerves; this protoplasmic material occupying the dentinal tubuli has not been shown to be nerve structure. How, then, may it be the medium or have the power of transferring sensations?

We have already noticed the very intimate relations existing between the odontoblastic prolongations or dentinal fibrils and the pulp. Let us now notice some of the characteristics of this so-called dentinal fibril. For this purpose we have recourse to some of the simplest forms of life, and from them receive valuable knowledge, as Paget so admirably writes: "The highest laws of our science are expressed in the simplest terms in the lives of the

lowest orders of creation." These odontoblastic cells forming the dentinal fibril seem to consist of simple masses of protoplasm, of which the amœbæ and the leucocytes are good examples, all possessing similar characteristics, so that we may draw reasonable conclusions from them. The amœbæ may be easily observed under the microscope. We find that it is capable of moving with extreme slowness from place to place; that it is sensitive to mechanical and chemical irritation, as shown by the change in its movements and in its form. It is especially sensitive to thermal changes. If the temperature be raised to 95 or 100° F., the movements are arrested, but if this amount of heat be not sustained too long, the amœba will resume its power of moving. The same thing occurs when the temperature is reduced to the freezing point. If the temperature is reduced below the freezing point or raised above 105° F., the movements entirely cease and are not resumed on raising or lowering the temperature again; in other words, there is cessation of function—the amœba is dead. This is the effect of heat and cold upon protoplasm, as shown in the amœba, the leucocyte, and, with possible modification, in the dentinal fibril.

These results suggest the possibility of painful sensations being transmitted to the pulp and thence to the brain through the agency of the fibril. They also suggest the possibility of injury to the pulp by means of hot or cold applications to cavities in the teeth. If this theory be true, then in every cut into the dentine with the excavator we are wounding living tissue, and this irritation is converted into pain when it reaches the pulp.

But my main purpose in calling your attention to the anatomy and physiology of the dentine is that we might better understand the effect of heat or cold as applied to sensitive dentine. Heat is applied in various ways, dry or moist, but one of the recent methods of using moist heat is that in which a jet of steam is applied to the cavity; others consist in the use of a spray from a very volatile liquid like

chloride of methyl, bromide of ethyl, or ether. In the use of these agents, as well as steam, the heat or cold is intense, and it seems to me that, in making use of such extremes of heat and cold, we may be expecting too much of the vitality of the dental pulp. The protoplasmic cell, identical in its nature with the dentinal fibril, is destroyed at a temperature above 105° F. or below 32° F.

The dentinal fibril being in such close connection with the pulp, and perhaps through it in some way fortified with an extra amount of vital force, or resisting power, may be able to recover after the application of a greater amount of heat or cold than a portion of isolated protoplasm. However this may be in the light of the foregoing statements, I am bound to say that I believe there is danger in the general use of such extremes of heat and cold as are produced by the spray of ether or chloride of methyl.

I am fully aware that these agents are used in a large majority of cases, as I have used them myself without perceptible injurious results at the time, and I believe that what has been written advocating these remedies is in the right direction, but I do not think sufficient time has elapsed to enable us to judge correctly. An application of steam two seconds longer in the case of one patient than in another may be enough to make the difference between success and failure. It seems to me that such nice adaptation to the temperament of an individual cannot always be made by ordinary mortals.

Now, I am sure that we can make use of heat or cold in sensitive dentine without injurious results, and in this way: By using an apparatus which will indicate the temperature; in other words, by knowing the dose to be administered. The method which I wish to commend, and which I believe can be used in the greatest number of ways, is the use of warm air at a certain definite degree. If we are to be guided at all by our observations of the effect of changes in temperature on the amœba, we shall not raise the heat above 110° F. or reduce it below the freezing

point. I am sure that I have accomplished much with this degree of heat, although I do not pretend in any dogmatic sense to fix the border line beyond which we cannot use heat or cold with safety.

I have recently been using Codman & Shurtleff's air-compressor, and have had several appliances made to connect with it, heating the air, still under pressure, and conveying it to the mouth, and by means of a valve and fine tube having it under full control. My last apparatus was an air-tight brass tank containing a thermometer, which indicates correctly the temperature of air *in the tank*, but very hot air in passing through six feet of rubber tubing will become cold.

I am experimenting with a much smaller instrument, which can be placed on the bracket table and brought near the patient.

Air, under pressure, made warm at will, may be made to serve many useful purposes besides obtunding pain. It is the very best means of producing a spray from any liquid, and there are many uses for the spray. Hot medicated air may be driven with great force if desired into a root canal, or used as a chip-blower, or to hasten the hardening of modeling composition when used for impressions of the mouth, to soften gutta-percha fillings or crown-settings, etc.

Permit me now, if you please, to indicate something in the line of treatment according to my view of the situation. We may find a condition of general or local nerve irritability, or both. I sometimes treat systemically, using laxatives if needed, followed by such sedatives as sodium bromide, Jamaica, dogwood, or aconite, avoiding the menstrual period when possible, and giving morning appointments as a rule.

A combination of kindness, patience, mesmerism, hypnotism, Christian science, mental healing, magnetism, sharp instruments and a steady hand is always on the shelf for use, and I see no antagonism or incompatibility between

the ingredients. For the local and the general condition in excessively sensitive dentine, the inhalation of ether has been with me a decided success. The patient usually holds the napkin and inhales until the first effects are produced, stopping short of unconsciousness. The odor is an objection, of course. I do not use it often, but when I do it is to me the king of remedies. I have frequently used nitrous oxide for this purpose with much satisfaction. But cocaine is the remedy that I use most, and I believe it to be the safest and most efficient local anæsthetic that we have at our command to-day. This is the way I use this agent and succeed: After the cavity is dry I make it dryer by the use of warm air; the dehydration of the tubules and the raised temperature not only lessen the sensibility, but also provide for the absorption of any medicament that may be placed in the cavity. Alcohol is also used for drying, alternating with the warm air until I think it sufficient for the purpose; it is then ready for the cocaine. I formerly made an alcoholic solution, but believe it to be better practice to use the cocaine and alcohol separately.

Our studies in experimental therapeutics show that alcohol is absorbed very slowly, if at all, while acidulous and chloroformic solutions are absorbed with facility. I therefore have used chloroform, alternating with an aqueous solution of cocaine, although I now make my solution of cocaine in chloroform alone. The dentinal tubules being deprived of moisture by means of alcohol and warm air, now readily drink up a chloroformic solution of cocaine.

I have used this method with the above modification with decided success. I think it is believed by the profession generally that cocaine is of little value in sensitive dentine, and I had reached this conclusion myself; but a physician once insisted upon my using it in his tooth, and he had so much faith in its efficacy, from his experience with it in the soft tissues, that I made a thorough application with fair success; later I became interested in experimental therapeutics, resulting in the use of cocaine as I now

use it. The only obstacle to its application in and around the teeth is the difficulty of securing absorption. If you once cause it to reach the spot where you want it to act, it will anæsthetize every time it is applied.—*International Dental Journal.*

ARTICLE III.

THE TREATMENT OF DEAD TEETH.

BY E. BALDING.

A paper read before the Students' Society, London Dental Hospital.

Mr. President and Gentlemen:

If any apology were needed for choosing such a well-worn subject as that of "Dead Teeth" for our discussion to-night, I offer as such my reasons for doing so, viz., the great number of such teeth we are called upon to treat, and the immense, and to the private practitioner, the vital importance of their successful treatment.

Dead teeth naturally fall into two classes, viz.:—I. Those whose pulps have been devitalized by the application of arsenious acid; and—II. Those which have lost their vitality previous to coming under our care.

I. The teeth of the former class need not detain us long. Here we have to deal with a tooth, the pulp canal or canals of which can never be in a more aseptic condition, and provided the pulp is withdrawn successfully, and the canals properly filled, there is not the least doubt as to the result of our work. There is no class of teeth more favorable for immediate root filling than this, and almost invariably this is the best treatment to adopt.

The first step is to thoroughly open up the pulp-chamber so as to get direct access to the canals. In the

case of interstitial cavities, this sometimes involves the cutting away of much of the crown of the tooth, and is easily effected with one of the new cross-cut burrs. Some operators advise, instead of extending these cavities, to make an entirely fresh opening by drilling straight through the crown into the pulp chamber, but there is very little advantage gained by this method, unless the bridge between the two entrances to the cavity is tolerably strong. Next, an attempt should be made to withdraw the pulp whole. This may be done by passing a very fine flexible watch-maker's brooch right to the extremity of the canal, and giving it one or two turns in order to sever its connection at the apex. Very often on withdrawing the brooch, the pulp will come away with it, but if it does not, it may be secured by passing up a barbed Donaldson bristle, or other nerve extractor. Should this also be unsuccessful, use with the engine a very fine Gates-Glidden drill which has had the point of the blade broken off, and this seldom fails to entangle the pulp and bring it away.

After cutting away all overhanging dentine from the canals, so as to make their orifices funnel-shaped, mop them out with absolute alcohol, or better still, a one per cent. solution of perchloride of mercury in absolute alcohol, and dry with the hot air syringe, or by inserting a piece of wire, made hot in the flame of a spirit lamp. There is no object. neither any advantage gained, but considerable risk run by enlarging the canal with a drill, except perhaps where the contents are partly calcified towards the proximal end. Having previously gauged the length of the canal by marking it on a brooch with a small disc of rubber dam, and the root being thoroughly cleansed and dried, we proceed to introduce the permanent root filling, and over this the permanent plug.

And this is simple enough, some one says, but what would you do in a case where the canals are so small as not to admit the passage of even a very fine bristle, as is commonly the case in the buccal roots of upper molars,

and the anterior roots of lower molars? To this I reply that I should leave them alone. Of course the proximal end of such a canal should be somewhat enlarged to make sure that it is not a deposition of secondary dentine which is merely blocking the opening, and if it is not so, the canal may very safely be left with some antiseptic in the enlarged part. Some little time ago exactly such a case came under my notice. The patient had a carious six year upper molar, and on examination I discovered a slight exposure, to which I applied arsenious acid. The patient came again in two days, and on opening up the pulp chamber I removed the pulp from the palatine canal without any difficulty, but on looking for the buccal canals, I could only make out two very minute openings which would not admit more than the point of the finest brooch. I endeavored to enlarge them, first with a Hern burr, and then with a drill, but as the obstruction continued I did not persist, but mopped out the cavity with perchloride of mercury, and inserted gutta percha points into the palatine canal, filled the pulp chamber with osteo and put in a gold plug. I saw this patient two days ago, and found that the tooth had not given the slightest uneasiness since it was filled. With these few words we will pass over the teeth of the first class.

II. The teeth of the second class—those which have lost their vitality previous to coming under our care—may be grouped into three subdivisions, which we will consider *seriatim*.

(*a*.) Under the first may be included those of which there is no history of alveolar abscess, but whose pulp has died either as the result of accident or disease. When this is the case, the contents of the canal will generally be in a state of putrid decomposition, and if the pulp chamber has been encroached upon by caries or otherwise, may be pouring out pus into the cavity. Sometimes when the pulp has died spontaneously without any obvious cause, it will be in a semi-liquefied condition, known as moist

gangrene, or less often we may find it shrivelled up as in dry gangrene, and more rarely still it may seem to have disappeared altogether. But whatever may be the pathological state of such teeth, their actual condition is by no means as favorable as that of the class we have just considered, and in their treatment it is impossible to exercise too much care. Proceeding as before, we remove all loose debris, and clear out the canal as well as possible, working all the time in the presence of, aad in the case of lower teeth, under a pool of some antiseptic, as creosote or peroxide of hydrogen, or a 1-250 solution of perchloride of mercury. The walls of the canal will probably be softened and soaked with the putrid contents, and now the Gates drill is called into requisition; it should be fine and used with a "touch-and-go" movement, continuing the use of the antiseptic, and with our gauge set on the drill, there should not be much fear of forcing any debris through the apical foramen. Now the canal must be thoroughly dried, and this is best done by mopping out with absolute alcohol, and then using the hot-air syringe, the alcohol having the power of dehydrating the dentinal tubes, and so causing them the more readily to take up whatever antiseptic may be used. There are now two courses of treatment open to us, in the adoption of either of which we must be guided by a careful consideration of the circumstances of each individual case. If there has not been the slightest indication of periostitis, or any pain whatever, and there is no reason to expect an untoward result from any other cause, such as absorption at the root, etc., we might feel perfectly justified in permanently filling the root and tooth at once. But should the conditions not prove so favorable, or should any doubt exist in our mind as to the result of such treatment, there can be nothing lost by delaying the permanent operation, and inserting a dressing of eucalyptus oil and iodoform. This is I think preferable to carbolic and iodoform, because the eucalyptus dissolves the iodoform, and being very volatile diffuses itself into every space left unoccupied.

The cavity is now filled with a plug of temporary gutta percha, and if at the end of a week the tooth has remained quite comfortable, the dressing may be exchanged for a permanent root filling, and a plug of gold, or whatever filling be most suitable, inserted. In cases where the patient cannot be seen again, and there has been slight periodontal irritation, caused no doubt by the presence of septic substance, Mr. Coleman recommends the following treatment:—Clear out the pulp cavity, wash out with carbolic acid, and lay over the opening a small disc of card saturated with carbolic, and having attached to the surface looking into the canal a small quantity of arsenious acid (about 1-16 grain). This is covered over with oxychloride of zinc, and the remainder of the tooth filled with gold or amalgam.

(*b.*) The second subdivision will include those teeth at whose root a blind abscess exists, or is in process of formation. Here our treatment may vary according to the stage to which the abscess has advanced. If it seems just beneath the gum, or if its actual position can be made out at all clearly, the treatment will be much simplified by anticipating nature by cutting down on or drilling into the sac from the gum over it, and treating as an abscess with a fistulous opening. If the abscess has not so far advanced as to warrant this course of treatment being followed, then the canal should be cleared as thoroughly as possible, and a loose cotton wool dressing with a little iodoform or perchloride of mercury inserted, and changed every day until it comes away clean and sweet. Some operators advise going through the apical foramen with a very fine drill so as to tear up the sac and draw the blood, and then putting in a dressing as soon as all bleeding or weeping into the canal has ceased. Although my experience has not been very great, I have found very good results follow this latter course of treatment in the few cases in which I have tried it; but whichever course is adopted, I should not advocate the practicing of immediate root filling.

Sometimes, however, by the force of circumstances we may be driven to adopt some immediate treatment, and the only one that occurs to me besides that of filling the root and treating the abscess externally, is that known as rhizodontrophy, which consists in capping over the pulp cavity, and at once filling the tooth; after which a fine hole is drilled either through the side of the tooth, just below and through the margin of the gum or through the filling itself into the pulp cavity. But in any case, as an aid to our treatment, the gum over the affected tooth should be dried and strongly and repeatedly painted with a mixture of equal parts of the double tincture of iodine and Fleming's tincture of aconite; in fact I deem it advisable to do this as a preventive after treating any tooth where there is any likelihood of inflammation being set up or increased.

(*c.*) The third and last subdivision comprises those teeth which are the subjects of an alveolar abscess, which having burst, has left a suppurating tract, opening generally at the summit of a pustule which is sometimes 1-8 or 2-16 of an inch long. Every now and again a small gumboil makes its appearance, enlarges, bursts and subsides for a while, only to reappear again and again. As a rule the patient experiences no pain from it, neither any inconvenience beyond that caused by the occasional liberation of the very offensive pus into the mouth. The majority of these cases are amenable to immediate treatment, which consists briefly in getting a few drops of some powerful antiseptic to traverse the whole length of the pulp canal and the sinus leading from its apex, and then permanently filling both the root and the crown. To my mind, the simplest and most satisfactory method of doing this is as follows:—Clear the canal as well as possible, and then cautiously but thoroughly cut away the immediate wall with a Gates drill; pass a very fine brooch up the canal so as just to force its point through the apical foramen, and then dry the canal. Now take the needle of a hypodermic syringe, and pass it as far up the canal as possible, without

using force; pack tightly all round it with gutta-percha, and having filled the syringe with the antiseptic, screw it on to the nozzle which carries the needle, then with very little pressure we shall almost immediately see our antiseptic oozing out at the sinus on to the gum. The best antiseptic for this purpose is strong carbolic acid, because one can tell by the white eschar it makes when it has reached the gum, and also because being such a strong escharotic, it cauterizes the coats of the sinus, and quickly causes it to heal up by granulation. Some prefer to use a less potent drug, as creosote, or peroxide of hydrogen, but when these are used it is necessary to allow a moderately good stream to pass through the channel before proceeding with the operation, and even then the cure is neither so sure nor so quick. In the case of carbolic it is only necessary to let one drop appear on the gum to effect a cure. When this has been done, remove the syringe and the surrounding gutta-percha, dehydrate the canal with absolute alcohol, mop out with perchloride of mercury, dry again, and insert the permanent filling both in the root and the crown. If a hypodermic syringe is not at hand, a tapering piston may be made to fit the canal, by winding cotton wool tightly round a brooch, dipping freely in carbolic and using with a pumping action till the white mark appears on the gum. About six weeks ago I inserted a gold filling in an upper central that had an abscess at its root with a fistulous opening, having previously treated it in this way and filled the roots immediately with gutta-percha points, the result being entirely satisfactory. If the abscess is one of very long standing, a variable amount of absorption may have taken place at the root. Sometimes on extracting a tooth that has refused to yield to any other kind of treatment, we find that perhaps 1-16 of an inch has disappeared from the apex in this way, and we shall be pretty safe in suspecting this to be the case in almost any tooth of this class, which does not seem disposed to yield to our conservative treatment, and then our only alternative is to attempt the radical cure.

About a year ago a case of some interest came under my notice. The patient, a man of about thirty, had an abscess in the lower jaw, and a sinus leading from it opening under the chin close to the symphysis. After enduring an intermittent discharge from it for three years, he came to this hospital and on examination it was found that the trouble proceeded from the right lower central, which was dead, but without the slightest sign of caries. An opening was made into the pulp chamber, and an attempt made to force some peroxide of hydrogen down the canal out on the chin, but without success, although there was considerable enlargement of the apical foramen, so a temporary dressing was inserted, and the patient seen every other day, the dressing being renewed each time. The discharge gradually lessened, and when it ceased the tooth was filled permanently. Since then there has been no further recurrence of the trouble, and the tooth which at first was loose has grown quite firm.

On the subject of root fillings a large field is opened to us for discussion, for the selection of a suitable filling is as important as it is an essential item in the treatment of dead teeth. Our one aim in filling a root is to effectually and permanently close the apical foramen, and so prevent the canal from becoming the receptacle of any bloody, serous or purulent exudation, therefore in stating the requirements of a good root filling I should place them in this order:—1st. That it should go the extremity, and this almost always necessitates its being solid. 2d. It must be easy of introduction, and adaptation to the various conditions of shape and size met with in different canals; 3rd. It must be capable of being easily removed, should circumstances require. One writer, I believe Mr. Tomes, also adds that it should be antiseptic. Therefore a perfect root-filling may be defined as a solid substance that will penetrate to the apex of the canal, is antiseptic, non-irritating and readily removable. The number of root-fillings in use are practically innumerable, almost every operator

having his own particular favorite, and thinking it in his heart to be the only right one, and if it were possible to enumerate them all, I would not take up your time by doing so, but still a brief allusion to some of those in ordinary use might not be considered out of place here. From being conservative in our treatment of teeth, I think we too often allow ourselves to get conservative in the use of root-fillings. In the selection of our material, we should be guided by a judicious consideration of the circumstances and conditions of each individual case, and choose our filling accordingly.

Of all root-fillings I have used up to the present, the most successful and the one answering most nearly to all the necessary requirements is gutta-percha in the form of fine tapering points. The method of using these is briefly as follows:—We will suppose that the canal has been cleared out, disinfected and thoroughly dried, as it should be before the introduction of any filling, it is now freely mopped out with chloroform, or a solution of gutta percha in chloroform, and taking one of these points in the conveying forceps, dip for an instant into chloroform and plunge to the end of the canal. It is best to cut the points to the length of the canal previously by the use of our gauge. If there is a plenty of chloroform in the canal it is not necessary to dip the points in it, as then there is the greater chance of their going home. If the canal is large it will take two or perhaps more of the points, and when full allow two or three minutes for the chloroform to evaporate, and then condense with a nerve canal plugger, and proceed to insert the permanent plug with or without a floor of osteo.

Next, in order of merit, I should be inclined to put a gold or copper wire in conjunction with chloropercha. The wire is drawn out very fine, and the end made slightly tapering. The canal is freely wiped out with chloropercha and the wire inserted, having itself been previously dipped in the solution. Some consider this superior to the gutta

percha, as it is stiffer and more likely to go to the extremity, but like the gutta percha, and, in fact, all other "points," it should be cut to the length of the canal as measured by our gauge.

Wood points, soaked in carbolized paraffin, may also be used in the same way, or in conjunction with oxychloride of zinc.

Shellac, mixed with a small quantity of wax, makes a very good filling. It is drawn out into extremely fine threads, with which the canal is filled, and the whole flooded with alcohol; as soon as they begin to soften more points are inserted till the canal is full. Iodoform wax on cotton wool is a filling that is used a great deal, and but for the difficulty, and even impossibility, to get it to go to the extremity in small canals it might be called a perfect filling. You are all familiar with the way in which it is used, so I will not take up your time by describing it, but I think the remarkable length of time it preserves its antiseptic power is worthy of note.

Another filling consists of paraffin placed in the orifice of the canal and melted in by passing hot bristles down. I have never had any experience of this mode of filling, but should think that it is only practicable in teeth in the lower jaw.

The oxyphosphate or oxychloride of zinc carried up on shreds of cotton wool with a bristle, is much recommended by some operators, but the great objection that it has is the difficulty of working, combined with the almost impossibility of getting it to the extremity, and when once up getting it down again; of course it is needless to add that it should be mixed very thin. Some discountenance the use of the oxychloride as being liable to set up irritation through the apex, while others prefer it because of its antiseptic properties.

Gold and tin foil being quite out of date and unsatisfactory in their use for root filling, I do not think it necessary to dwell upon them to-night.

A very fair filling is made of plaster of Paris, mixed thin with a one per cent. solution of perchloride of mercury. The canal is first wiped out with the perchloride and then the plaster coaxed up with a bristle or on shreds of cotton wool, but no time must be lost in this operation or the plaster will set before the canal is properly filled, and some minutes should be allowed for the plaster to harden before the permanent plug is introduced.

Amalgam is another filling that is patronized by a goodly number of operators, the only fault I have to find with it is, that once in it is a fixture and is practically impossible to get out. Sullivan's amalgam is the best to use for this purpose on account of its preservative, antiseptic, and hardening action, but before inserting, the apex of the canal should be closed with a scrap of gutta percha.

A mixture of tin and lead, made into points like the gutta percha, has been used sometimes, but not having had any experience of them I cannot say how they answer.

During the last year Mr. Tomes has introduced a new root-filling in the form of celluloid, such as is used to carry the sensitive photographic film. The *mode d'emploi* is as follows:—The celluloid is first cut into exceedingly fine strips, the canal having been thoroughly dried is mopped out with collodion, and one of the strips is taken in the plugging forceps, dipped into the collodion, and coaxed up the root, after which guncotton is carried up on bristles and packed in. This is very similar to the gutta percha points, with the exception that the celluloid is square at the end while the gutta percha is pointed, an exception which I think goes in favor of the gutta percha. The advantages claimed for this by Mr. Tomes, are that the strips so prepared have considerable stiffness, and are yet flexible and very tough, and also that they make an antiseptic and absolutely non-irritant filling.

Lastly, we have a number of wool dressings, which, although they make admirable dressings, are not admissible as permanent fillings, albeit they are sometimes used as

such. These chiefly consist of iodoform and eucalyptus oil, carbolic, creosote, perchloride of mercury, and arsenic.

Iodoform and eucalyptus has been known to preserve its smell after being in a tooth several years, but carbolic and creosote lose their power after a short time. The use of arsenic has been recommended by Mr. Coleman in certain cases because of its very powerful property.

In conclusion, allow me briefly to recapitulate those points of treatment which are of prime importance. First, there is the free exposure of and direct access into the pulp chamber and the openings of the canals. Then the thorough cleansing, disinfecting, and dehydration of the roots, and finally their accurate and complete filling.

It only remains for me to thank you, gentlemen, for the patience with which you have listened to my desultory paper. I feel that I have done but scant justice to a subject on which volumes have been written by far abler pens than mine, but which is still the vortex of a whirl of interminable debating. I can only hope that what is deficient may be supplied by a lively discussion.—*Dental Record.*

ARTICLE IV.

DENTAL MEDICAMENTS WITH SPECIAL REFERENCE TO ANTISEPTICS.

BY J. W. JUNGMAN, D. D. S., CLEVELAND, O.

Experiments of eminent bacteriologists and other scientists have proven, beyond a doubt, that bacteria cause and develop abscess of the alveolus, antrum, necrosis and caries of the teeth; therefore the dental surgeon should be familiar with this subject, should know the difference between antiseptics, escharotics, astringents, etc.

Antiseptics are medicinal agents capable of arresting

fermentation, thereby preventing the decomposition of organic substances. When these agents are brought in contact with the disease germs they destroy their vitality. Included in this class are carbolic acid, creosote, salicylic acid, boric acid, iodol, peroxide of hydrogen, bichloride of mercury, and many others, but the above named being of more interest to the dentist.

In my practice, which has been of short duration, I have had several cases where antiseptics, astringents, escharotics, etc., were indicated, the principal case that of an abscess of the antrum. A gentleman about 62 years of age came to me with a fistulous opening in the region of the right superior molar which had fallen out by disease (pyorrhœa alveolaris). The bony cavity had nearly closed with the exception of a small crack large enough to admit a spatula. I pronounced it abscess of the antrum, and then proceeded to treat. The first thing I made the opening as large as the end of my little finger to afford free drainage; about half a drachm of pus exuded therefrom. I syringed the cavity thoroughly with a warm solution of Hg Cl2, 1 to 3,000, then placed a bit of loose cotton in the cavity. This treatment was continued about a week, but not with the best of success, so I used an escharotic to break down that secretory membrane; for an antiseptic wash I used resorcin with good results.

This antiseptic is a chemical compound of phenol and aromatic series to which carbolic acid belongs. It is obtained from certain resins by action of fusing alkalies, and is in the form of tabular prismatic, shining crystals, somewhat sweetish to the taste and very soluble in water. This remedy is considered preferable to carbolic acid; it is very valuable to the dentist; it may be applied in all cases where antiseptics are indicated.

Carbolic acid is obtained from coal tar by fractional distillation and subsequent purification, being extracted from the heavy coal tar oils. When pure it is in the form of a colorless acicular interlacing crystals, which at 95° F.

become an oily liquid, possessing a strong odor and taste closely resembling creosote in characteristics and properties. although it is a different substance. Much of what is called creosote is nothing but impure carbolic acid. It is one of the most universal antiseptics now in use; it is not only an antiseptic, but an escharotic, styptic, stimulant, etc., therefore making it a very valuable remedy in dental therapeutics. When applied to carious dentures it not only obtunds sensibility, but arrests putrefactive changes in the devitalized structures and coagulates the albuminous elements at the ends of the dentinal tubuli. It relieves odontalgia when applied to the surface of an exposed and painful pulp; when applied to an exposed pulp it forms by escharotic action an eschar, which some regard as conductive to the recovery of the organ, while others regard the quiescent state it produces as an indication of the degeneration of the pulp, and hence prefer to use it in a diluted form. Many object to the odor of the acid, but oil of cloves added to it will disguise its taste and odor to some extent.

Phenol sodique is also extensively employed in dental practice. It is composed of pure melted carbolic acid, 5 parts; solution of caustic potash, 1 part; distilled water, 5 parts. We have many mouth washes, lotions, etc., which contain carbolic acid. The following wash can be used to good advantage:

R Acid carbolic - - - gtt x
Glycerine - - - - ʒ ij
Aqua - - - - - ʒ v
M. Sig. Use as a gargle.

The Robinson remedy, which contains equal parts of caustic potash and carbolic acid, has been proven to be a valuable remedy in the treatment of pyorrhœa alveolaris.

Creosote, like carbolic acid, is a valuable agent in dental therapeutics, although the use of the latter has in some respects superseded that of the former, and being very similar in their action with some advantage in the case of carbolic acid.

Salicylic acid is also a very valuable agent in dental surgery. It is obtained by combining carbolic acid and caustic potash and snbjecting this compound to dry carbonic acid, under the influence of heat and by a process of distillation which liberates the salicylic acid in crystals; the crystals are then washed, dissolved in hot water and by crystallization we have the light brown powder, which is then bleached until it is quite white, but most of that sold is of a light cream color with a reddish tinge. It has no odor, a slight taste, and is very soluble in water.

Eucalyptus is another popular agent. It is obtained from eucalyptus globulous found originally in Australia, known as the "blue gum tree." These trees are growing in the southern parts of Europe and the United States, and in Northern Africa their presence is said to be a prevention of malaria. The oil of eucalyptus, either alone or combined with iodoform, forms one of the most effective antiseptics in use for the treatment of putrescent pulps of teeth, alveolar abscess, pyorrhœa alveolaris, foul ulcers, etc. Iodoform is a preparation of iodine, being obtained by action of chlorinated lime upon an alcoholic solution of iodide of potassium, heated at 104° F. It is in the form of small crystals of a yellow color, with an unpleasant taste and soft to the touch. It is volatile and soluble in alcohol, chloroform and ether, the fixed and volatile oils, but insoluble in water. This antiseptic possesses no escharotic properties sufficient to cause any irritation or destruction of the soft parts. Dr. C. N. Peirce recommends iodoform ground up with equal parts of oil of cloves and oil of eucalyptus, which forms a substance of a soft, cheesy consistency, a portion of which can be introduced to an inflamed part on a point of a small broach. Iodoform is also used as an anodyne for the relief of pain following the extraction of teeth affected with periodontitis. A great objection to iodoform is the unpleasant odor, but this can be disguised to some extent by adding a drop of oil of rose, oil of lavender, oil of cinnamon, or finely ground coffee.

Peroxide of hydrogen is also a valuable agent and at present very extensively used, although it was discovered in 1818. It is obtained by rubbing up peroxide of barium with distilled water so as to form a liquid paste, which is added gradually with constant stirring to distilled water. Acidulated with one-third of its weight of hydrochloric acid, contained in a vessel immersed in a freezing mixture when the muriatic acid is saturated, a fresh quantity of the acid in concentrated state is added, then more of the peroxide of barium, and then the operation repeated till the solution will hold no more chloride of barium, which is deposited by a mixture of ice and salt, except a small portion which is gotten rid of by adding sulphate of silver; the filtered liquid is then concentrated by sulphuric acid, and then the water rising in vapor is absorbed and peroxide of hydrogen is obtained nearly pure in the form of a colorless liquid. Peroxide of hydrogen is used especially in the treatment of alveolar abscess, alveolar pyorrhœa, ulcerations of the mucous membrane, gangrene, cancrum oris, fungus growths, bleaching teeth, etc. The essential oils are valuable dental antiseptics, prinaipally the following: Cajeput, cassia, cinnamon, cloves, eugenol, eucalyptus, phenol, mustard, caraway, peppermint, sassafras, thyme, pennyroyal, turpentine and wintergreen. Oil of cassia, diluted with bland oil, like that of wintegreen, is a valuable dressing for putrid root canals and abscesses. Dr. Black recommends the following mixture:

R	Carbolic acid - - -	1 part
	Oil cassia - - - -	2 parts.
	Oil wintergreen - - -	3 parts.

Mix the oils and add the melted crystals of carbolic acid; this is known as the 1, 2, 3 mixture. Scientists have discovered several good antiseptics within the last two years, but will not dwell upon them this evening.—*Ohio Journal of Dental Science.*

ARTICLE V.

THE DENTAL PULP.

BY W. XAVIER SUDDUTH, A. M., M. D., D. D. S.,

Professor of Pathology and Oral Surgery in the University of Minnesota.

Objection has been raised against the use of the term dental pulp, some holding that the formative organ of the dentine should be called the dental nerve, as it is even now designated by the laity, because of the fact that when in an inflamed condition it is extremely sensitive.

Considered from the stand-point of histology and compared with other portions of the body, we find that it is much less highly organized and presents few of the special characteristics which entitle it to classification as nervous tissue. The greater portion of the mature pulp is composed of ordinary connective-tissue elements, being made up of filiform and fusiform cells, presenting no regularity in arrangement, but crossing and anastomosing in all directions.

Upon the surface of the pulp, forming part of it, is a layer of cells termed odontoblasts. They are developed from the ordinary embryonic connective tissue cells, but are specially endowed with the function of secreting the dentine. These cells are possessed of one or more fibrous prolongations which extend into the tubuli of the dentine. To these fibers of the odontoblast has been given the name of dentinal fibers because of their location.

The pulp is a very vascular organ. Its blood-supply consists of a few vessels of considerable size and numerous capillaries, which ramify throughout the entire organ.

It is also well supplied with nerve-elements. These consist of medullated and non-medullated nerve-fibers which terminate in the odontoblastic layer. They do not,

however, present the same fineness of subdivision as is found in the terminal nerve fibers of the cornea.

Some writers hold that the sensitivity of inflamed dentine in decay indicates the presence of nerve-fibers in the dentinal tubuli. Such is not necessarily an absolute deduction, as an inherent property of protoplasm is the power of conducting sensation, which latter is not confined to nerve-fiber alone. It is also well known that in inflammation this property is highly exalted. The term sensitive dentine is a misnomer, as the sensation is confined to the dentinal fibrillæ, and the degree of sensitivity is in the inverse ratio to the attenuation of the fiber; hence the most sensitive point is found at the union of the enamel and dentine, where the fibers reach the finest sub-division. The more delicate the filament the more exalted its power of transmitting sensation, and inflamed dentine does not present any distinctive features not exemplified in other portions of the body under similar inflammatory conditions.

The most common conditions of inflammation that dentists come in contact with are pulpitis and periodontitis. They are not, as a rule, called upon to treat inflammations in other portions of the body, consequently are but little acquainted with inflammation in its general aspect. There are several places where inflammation is even more intense and painful than it is in the pulp. The eye is a most notable example, also the ear and the organs of generation, not to speak of the central nervous system.

Periodontitis is allied to inflammation in the periosteum, and differs in no whit from such processes wherever found in connection with the osseous system, and is always very painful. It appears to be the tendency of dentists to magnify the intensity of the conditions they are called upon to treat, largely, as we have intimated, because of their limited acquaintance with the processes of inflammation in general, while the tendency among physicians is to minimize the conditions, because of their lack of knowledge of the special conditions found in the mouth.

It is not our intention to displace the dental pulp from the list of sensitive tissues when inflamed, because it does not differ from other tissues under similar conditions, but to compare it with other tissues in order to impress upon the mind the need of greater care in manipulation. Dentists, as a rule, when judged from the stand-point of delicacy of touch and carefulness in manipulation, make a very poor showing when compared with ophthalmologists.

An indifference to expressions of pain seems to grow upon some dental practitioners as practice increases, and they find themselves growing less appreciative of the niceties of practice which gained for them their reputation as careful operators. If the above stricture is true, and we firmly believe it is, then the reputation of the dental pulp to be the most sensitive organ of the body is largely due to our carelessness as operators.

Before dentistry was known, the favorite expression for a condition of extreme sensitivity was "as tender as the apple of the eye," but now, thanks to an extended acquaintance with the operating chair, the more modern phrase, "as tender as the nerve of a tooth," has been introduced. This comparison is not intended to be invidious, nor to build up one specialty at the expense of another. It is well, however, at times, to see ourselves as others see us. Let us see to it in the future that the incubus is removed from our shoulders, and the "apple of the eye" restored to its former position as the most fitting term of comparison for extreme sensitivity.—*Cosmos.*

Editorial, Etc.

MISSOURI STATE DENTAL ASSOCIATION.

PARTIAL PROGRAMME.

LOUISIANA, MO., JULY 7, 8, 9, 10, 1891.

PAPERS.

1. Dr. J. F. McWilliams, Mexico—"President's Address to State Association." Discussion opened by Dr. J. B. Newby, St. Louis.

2. Dr. J. D. Patterson, Kansas City—"Medication in the Treatment of Pulp Canals." Discussion opened by Dr. Theo. Stanley, Kansas City.

3. Dr. B. Q. Stevens, Hannibal—"The Preparation of the Mouth, and Plate Work." Discussion opened by Dr. Wm. N. Morrison, St. Louis.

4. Dr. Frank Slater, Rich Hill—"The Devitalization and Removal of Tooth Pulps." Discussion opened by Dr. J. E. Crozier, Lee's Summit.

5. Dr. J. D. McMillen, Kansas City—"Crown and Bridge Work—Use and Abuse of Same." Discussion opened by Dr. T. M. Nicholson, Fayette.

6. Dr. A. H. Fuller, St. Louis—"Preparation of Cavities." Discussion opened by Dr. H. S. Lowry, Kansas City.

7. Dr. Wm. H. Eames, St. Louis—"Review of Dr. Miller's Work, with Personal Observations." Discussion opened by Dr.————

8. Dr. Geo. L. Shepard, Sedalia—"Dental Fees." Discussion opened by Dr. L. A. Young, Neosho.

9. Dr. J. M. Austin, St. Joseph.—"Report on New Appliances." Dr. A. J. Prosser, St. Louis—"Report on Clinics."

10. Dr. I. D. Pearce, Kansas City—"General Anæsthetics in Relation to Oral Surgery." Discussion opened by Dr. L. E. Day, Nevada.

11. Dr. E. E. Shattuck, Kansas City—"Regulating Appliances." Discussion opened by Dr. W. L. Reed, Mexico.

CLINICS.

1. Dr. J. D. Patterson, Kansas City—"Pulp Canal Filling."

2. Dr. J. Stephen Coyle, St. Louis—"Open-faced Crowns."

3. Dr. J. F. Hassell, Lexington—"Soft Gold Filling."

4. Dr. E. E. Shattuck, Kansas City, will exhibit "Regulating Appliances."

5. Dr. N. W. Pence, St. Louis—"Gold Filling, Operator doing his own Malleting."

6. Dr. R. R. Vaughan, Fulton—"Copper Amalgam. Will also exhibit Bridge Work."

7. Dr. D. J. McMillen, Kansas City—"Soft Gold Filling."

8. Dr. B. Q. Stevens, Hannibal—"Amalgam Filling, to demonstrate packing and finishing. Will exhibit dies for striking up Face Teeth for Plate Work—Combination Fillings—Pulp Canal Impressions."

9. Dr. J. T. Fry, Moberly—"Compound Gold Filling."

10. Dr. J. B. Vernon, St. Louis—"Bicuspid Crown—Porcelain Face."

11. Dr. T. B. Carr, Stanberry—"Extracting."

12. Dr. E. B. Crane, California—"The Crane Vulcanizer and a new method of moulding Rubber Plates. Will also show plates made the old way."

13. Dr. W. H. Buckley, Liberty—"Small Bridge Richmond Crown Attachments."

14. Dr. Geo. A. McMillen, Alton, Ill., will show the best Foot Blow Pipe for country dentists—those who have no Gas."

The exercises opened with prayer by the Rev. Dr. A. C. Tuttle, of Mount Vernon M. E. Church. The mandamus was read by the Dean, Prof. Ferdinand J. S. Gorgas, M. D., D. D. S.; the address to the graduates was delivered by Rev. J. J. G. Webster, D. D., of Madison Avenue M. E. Church, and the class oration by William H. Conner, D. D. S., of New Jersey.

The number of graduates was sixty-four, and the number of matriculates for the session was one hundred and sixty-three.

The degree of D. D. S. was conferred on the following graduates by the Dean, Professor Gorgas, in the absence from illness of Hon. S. Teackle Wallis, LL. D., Provost of the University:

Harry W. Allwine, Nebraska; J. Perrin Anderson, South Carolina; Henry C. Bagby, M. D., California; Denison Holmes Baldwin, Virginia; Frederick A. Barr, Montana; James G. Benjamin, Montana; Capers W. Blalock, Florida; John D. Booth, Canada; J. William Boozer, A. B., South Carolina; Aubrey R. Bowles, Virginia; Emory M. Bowlus, Maryland; Charles S. Boyette, North Carolina; Elvie S. Boyle, Maryland; Samuel S. Brotherton, Iowa; George L. Bruce, Maryland; F. Wayne Chessrown, Pennsylvania; M. H. Pettway Clark, North Carolina; William H. Conner, New Jersey; Geo. L. Deichmann, Maryland; William Earle, South Carolina; Will H. Ewald, Virginia; William Meade Feild, Virginia; Herbert F. Gorgas, Maryland; J. William Grove, Pennsylvania; W. Oakley Haines, Maryland; Jacob V. Haller, Virginia; Henry F. Harris, Virginia; Marion Y. Hart, Virginia; Will W. Hayes, Pennsylvania; J. Henry Hoffman, Maryland; Charles W. Howard, New Hampshire; Edward T. Jones, Virginia; John C. Lœschcke, Virginia; Edwin A. Martin, L. D. S., Canada; Oscar Matt, New York; Virgil J. McComb, Missouri; Clyde M. McKelvey, Pennsylvania; T. Benton Moore, Pennsylvania; Frank A. Pattison, New York; William B. Poist, District of Columbia; William E. Prather, North Carolina; Bernard F. Riedel, Maryland; Richie W. Riley, South Carolina; Johannes Rilke, Germany; Frank Robinson, L. D. S., England; George B. Rounds, Canada; Heinrich Sengebusch, Germany; Henry B. Snow, Maryland; E. Alva Solomons, South Carolina; Alfred E. Sparks, Canada; A. Hume Sprinkel, Virginia; C. Carfer Sprinkel, Virginia; F. Myron St. John, Connecticut; Frazer P. Stehley, West Virginia; J. Frank Stevens, Pennsylvania; George W. Stevenson, New York; R. E. Lee Taliaferro, Virginia; Charles A. Turner, Canada; Adolf W. A. Volck, Germany; Albert S. Wells, North Carolina; George F. White. New York; Robert J. Whitfield, Canada; Charles E. Wingo, M. D., Maryland; Charles Rockwell Wood; New Hampshire,

The University prize, gold medal, was awarded to Aubrey R. Bowles, of Virginia, for the highest number of votes at the final examinations. Virgil J. McComb, D. D. S., of Missouri, received honorable mention for the second highest number of votes.

The Alumni Banquet was held after the Commencement exercises.

ATKINSON RESOLUTIONS—ST. LOUIS DENTAL SOCIETY.

We, your committee, appointed to present resolutions of respect to the memory of the late Dr. Wm. H. Atkinson, New York City, beg leave to offer the following:

WHEREAS, The members of the St. Louis Dental Society have learned with deep regret of the sad death of one who has been so closely identified with every advance made by the dental profession during the past twenty-five years; whose honorable career as a professional man has won for him a world-wide reputation, and whose personal qualities secured for him the love of every reading dentist in the world.

Resolved, That the St. Louis Dental Society recognizes the obligation dentists of America owe to the late Dr. Wm. H. Atkinson for the zeal and energy with which he has advocated the many changes which have been for the elevation of his chosen profession.

Resolved, That as a mark of appreciation of the worth of the late Dr. Wm. H. Atkinson, as a man and dentist, these resolutions be spread upon the records of this Society, a copy be sent to the family, and to the dental journals for publication.

WM. CONRAD,
WM. H. EAMES,
J. B. NEWBY,
} *Committee.*

The Florida State Dental Association will hold its next annual meeting in Jacksonville, June 2nd to 4th.

GEO. H. PERINE, *President.*

WM. BAYLOR, *Cor. Sec'y.*

MINNESOTA STATE DENTAL ASSOCIATION.

The Minnesota State Dental Association will hold its regular annual meeting July 8, 9 and 10th in St. Paul.

L. D. LEONARD, *Sec'y.*

Monthly Summary.

THE PHYSIOLOGICAL ACTION OF SULPHALDEHYDE.—Sulphaldehyde, produced by the action of sulphuretted hydrogen on ethylic aldehyde, occurs in the form of an oleaginous liquid of a repulsive odor, solidifying slightly below the freezing-point. Treated with acids, sulphaldehyde is transformed into a solid, the point of fusion of the various articles of commerce varying in accordance with their greater or less purity. Its analogy in composition to paraldehyde led Dr. Lusini to test the physiological action of the sulphaldehyde, administering it by injections intraperitoneally, and into the stomach of rabbits and frogs (*Les Nouveaux Remedes*, November 8, 1800).

It appears that sulphaldehyde produces profound and and tranquil sleep without any phenomena of excitation. On account of its insolubility, some time is required before its effects follow its administration; nevertheless, it is claimed to be much more energetic than paraldehyde. It is eliminated completely by the urine, to which it gives its characteristic odor.—*Therapeutic Gazette.*

1 gal
235 +

1 gal
235 +



